

ROYAL BOTANIC GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

No. 6.]

[1906.

XXX.—PLANT DISEASES. V.—DISEASED APPLES
AND MELONS FROM THE CAPE OF GOOD HOPE.

(With Plate.)

The subjoined letter has been received at Kew from the Cape of Good Hope Government Commercial Agency, 73, Basinghall Street, London, E.C. :—

“I have taken the liberty of forwarding to you one box containing apples of various kinds, which have been grown in Cape Colony. You will notice that they are all disfigured with marks or spots, and I am informed by the apple judges that these marks prevent the fruit being of any commercial value.

“Would you kindly inspect them and give me all the information that you possibly can that will be of value to the fruit growers of Cape Colony, as to what the spot or fungus is; what it is caused through, and what is the most effectual and cheapest remedy that can be employed in the Cape Colony to get rid of it.

“I have also sent a melon which has spots on it.”

The subject has been investigated by Mr. Massee, Principal Assistant, Cryptogams, Herbarium, Kew.

APPLE DISEASE.

The first evidence of disease is indicated by the appearance of minute, scattered, discoloured blotches on the skin; these blotches are confined to the calyx or “eye” end of the fruit, or in other words, to that portion *not imbedded in the packing material* contained in the case in which the apples were stored. *The lower half of the fruit, imbedded in the packing material, remained in every instance perfectly free from blemish.* For several weeks

the blotches continued to increase in size, ultimately attaining a diameter of about one-sixth of an inch, and at the same time becoming sunk or depressed below the general surface. When this stage is reached, if the apple is pared, a rust-coloured patch of flesh is found underlying each blotch. Microscopic examination showed the cells composing the rust-coloured patches to be dead and collapsed—hence the depressions—and crowded with starch grains, whereas the starch had entirely disappeared from the healthy cells in the process of ripening.

Neither fungi nor insects play any part in the disease under consideration, which is of a purely physiological nature, and in ordinary language may be stated to be due to irregularities in the ripening of the fruit.

To make this point clear, a brief explanation of the changes that take place during ripening, and the combined causes, is necessary. When an apple is fully grown and entering on the ripening period, it contains a considerable amount of malic acid and starch in its tissues. Of course the fruit is yet living and respiration continues, which results in the conversion of the acid and starch respectively into other substances, mostly sugar. During the end of the ripening period a certain amount of fermentation takes place, whereby a portion of the sugary matter is converted into alcohol and volatile acids. By this means certain substances—ethers—are formed, which constitute the perfume or aroma of fruits.

It is important to remember that the rate of respiration or ripening depends almost entirely on temperature, and the amount of oxygen present in the air to which the fruit is exposed. When conditions are favourable for ripening, the malic acid is oxydised and disappears first, followed by the starch. When the temperature is high, the acid oxydises very quickly and fermentation commences, which often kills the cells and thus prevents further ripening. This is exactly what has happened to the fruit under consideration. Owing to excess of temperature during the early period of ripening, certain groups of cells were killed by fermentation commencing before the starch was converted into sugar, which resulted in the dead, rusty patches of flesh. Starch is most abundant near the periphery of the apple, and is almost absent towards the centre; this is why the rusty, dead patches always occur just under the skin.

On the other hand, when fruit is kept at a temperature not exceeding 35° F., ripening proceeds normally, as the acid is not oxydised sufficiently quickly to set up fermentation at too early a stage.

The relative amount of oxygen present in the air determines to a great extent the operation of ripening, as respiration depends on the presence of this element, and in some modern fruit rooms only a sufficient amount of oxygen is allowed to be present in the air to keep the fruit just alive, when the object is to retard the period of ripening. Judging from results already arrived at it would appear that the careful regulation of the supply of oxygen in the fruit room, will, in the near future, be the most important factor concerned in the process of ripening fruit.

SUMMARY.

The injury was due to the fruit being subjected to too high a temperature during the first period of ripening. Whether this occurred previous to, or during the voyage could not be determined.

The fact that the lower half of each apple that was buried in the packing material remained perfectly free from disease, suggests that if the fruit was completely covered with packing material so as to exclude the free access of air, no injury would be sustained.

MELON DISEASE.

When first received, small, roundish, pale brown patches were present in scattered groups on the surface of the rind. Diseased portions were removed and placed under conditions favourable for further development; the diseased patches continued to increase in size, changed to a dark brown colour, and became slightly depressed, and within ten days were covered with a minutely velvety blackish-olive mould, which proved on examination to be *Macrosporium sarcinula*, Berk., first met with many years ago on the rind of a gourd. At the present day it frequently occurs on imported melons, and appears to be widely distributed. The conidia or reproductive bodies of this black mould are produced in immense quantities, and are scattered by wind, insects, etc.; those that happen to alight on a young melon infect the fruit, and produce a new centre of disease, from which conidia are distributed in turn; hence, when once introduced, the disease spreads quickly unless preventive measures are promptly resorted to.

Experiments proved that the conidia of the black mould would also grow and produce fruit on different kinds of decaying vegetable matter; the conidia thus produced would also be capable of infecting young melons.

After the black mould has disappeared, a second form of fruit belonging to the same fungus is produced in the substance of the dead rind. The spores of this second form of fruit only germinate after a lengthened period of rest, and presumably, as in numerous other well-known instances, these resting-spores are dispersed and germinate about the time when the plant they attack is in full growth. Such spores would be the first to infect the young melons, and give origin to the black mould, which in turn continues the disease throughout the period of growth of the host-plant.

SUMMARY.

Cleanliness, as in the case of every disease, is of primary importance. Decaying vegetable matter of every kind, so far as practicable, should be removed and buried. Diseased melons should not be allowed to rot and decay on the ground, otherwise a crop of spores will be produced which may result in disaster the following season.

On the first indication of disease the entire crop should be sprayed with a fungicide. The surrounding ground should also

be sprayed. When the disease has existed previously, spraying should be done at an early period of growth, even if no disease is present.

The well-known Bordeaux mixture, half strength, might be used; or in its place a solution of sulphide of potassium (liver of sulphur) would also prove effective—sulphide of potassium, one ounce, dissolved in three gallons of water.

Fungicides act differently on foliage under different climatic conditions, and experiment alone can show the relative strength of the mixture that may be used without scorching the foliage or fruit.

XXXI.—EXPORT OF PARA RUBBER SEEDS.

The following valuable note by Mr. H. N. Ridley, of Singapore, is reprinted from the *Agricultural Bulletin, Straits and Federated Malay States*, Vol. V., No. 1 (1906):—

“As is well known, the seed of the Para rubber tree deteriorates very rapidly after it is ripe, and soon loses its germinating power. It is not always easy to send seed long distances without a very large percentage of losses; at the same time the demand for seed in distant parts of the world is very considerable, and a good many experiments have been tried in the Botanic Gardens in various methods of packing to ensure their arrival in good condition. The reports received from the recipients of these seeds have been remarkably good, as the following records will show—7,500 seeds sent to Jamaica on August 31st were received on 25th October, and Mr. Fawcett writes: ‘The 7,500 seeds sent in biscuit tins are all germinating very well, and we shall scarcely lose 500 of them.’”

[With reference to this consignment Mr. Fawcett remarks in the *Bulletin of the Department of Agriculture, Jamaica*, Vol. IV., No. 7 (1906): “Over 87 per cent. of the seeds sown germinated, but some of the seedlings were constitutionally weak and died, so that only 5,071 plants survived, or about 68 per cent. of the seeds sown. A Wardian case arrived with 2,500 seeds, but only 18 plants were raised out of the whole number.”]

“One hundred were sent in a similar manner to Calabar on the date July 6th, and arrived on September 20th. The Acting Secretary writes in reply: ‘The seeds were soaked in water for two days on their arrival, and were then planted with the upper portion left above the soil. Ninety out of the hundred seeds have already germinated (November 7th), and appear healthy young plants.’

“To the Royal Gardens, Kew, 135 seeds were sent on July 6th, packed in charcoal in a biscuit tin. They arrived in a month, and 123 germinated. On February 12th, 1903, 20 seeds were sent to Mr. J. C. Harvey, Vera Cruz, Mexico, who writes, May 19th, 1903, that ‘out of the 20 seeds of *Hevea brasiliensis* I have 14 young plants. They came up in a few days, and possibly a few more may germinate, though three seeds were decayed.’ These were

all sent in biscuit tins. Those sent to Jamaica were packed in slightly damped incinerator earth, but it was necessary to replace the upper part of the packing with sawdust to reduce the weight, as incinerator earth is very heavy, and the box, a two-pound tin which contained 150 seeds, would have been over parcel post weight.

"The other tins were filled with damp charcoal finely powdered. In packing a certain amount of care is required in damping the charcoal so as to get it equally moistened all through, and not either over wet or over dry. This is best done by damping the charcoal thoroughly, and then drying it in the sun, constantly stirring and turning it over till it is uniformly slightly damped. The incinerator earth, which had been exposed to the elements, was damped when received, and only wanted partial drying to fit it for packing. Its weight is against its use, but both it and the powdered charcoal have the great advantage of preventing any attacks of mould or bacteria likely to cause decomposition. Other experiments with powdered coir fibre and coir dust, sawdust, and variously prepared soils have been tried, but the results do not seem to have ever been as successful. One experiment was made in putting the seeds in water for a month, and, though that might be effective for a fortnight or so, they had all perished by the end of the month."

XXXII.—EAST INDIAN DRAGON'S BLOOD.

(*Daemonorops*, Spp.).

East Indian Dragon's Blood, a well known commercial article, is a hard resin obtained from the shells of the fruits of a number of species of climbing palms (Rattans) belonging to the genus *Daemonorops*. This genus includes about 80 species, but of these only a few, referred to the section *Piptospathae*, yield Dragon's Blood. Mr. E. M. Holmes, in the *Pharmaceutical Journal* for December, 1905, p. 833, has largely increased our knowledge of the botanical origin of this substance. More recently in the *Agricultural Journal of the Straits and Federated Malay States* for February, 1906, Mr. H. N. Ridley has still further added to the information available on the subject, which is summarised below.

The resiniferous species, from the various localities in which the substance is obtained, are as follows :—

MALAY PENINSULA.

D. didymophyllus, Becc. Common in forests in Singapore, Johor, Perak, Penang. This species has a stem about 12 feet long, and is known as Rotang Hudang and R. Butong, and is very abundant. The fruits are very rich in Dragon's Blood.

D. micranthus, Becc. Common in the Peninsula, occurring in Bukit Timah, in Singapore, Malacca, Johor, Negri Sembilan. The stem is 30 or more feet in length. The greater part of the resin from the Malay Peninsula appears to be afforded by this species. The young rattans are known in Johor as Rotan Tahi Ayam.

D. propinquus, Becc. Found in forests in Singapore, Malacca, Selangor, Kemaman, Penang and Perak; also in Sumatra. A species closely resembling if not identical with *D. Draco*, Bl. Fruits usually covered with resin.

SUMATRA.

D. Draco, Bl. (*D. ruber*, Mart.). The Rotan Jernang of Sumatra. It grows to a height of 60 feet, and is as thick at the base as the forearm. This was described originally by Rumphius (*Herb. Amboinense*, V. 114) as the source of Dragon's Blood. He gives a long account of it, from specimens sent to him from Djambi and Palembang in Sumatra. He, however, confused it with *D. accedens*, Bl., with broader leaflets and more ovoid fruit, the *D. ruber*, Mart., a native of Java.

BORNEO.

D. Draconcellus, Becc. According to Beccari this is the Rotan Jerenang of the Dyaks. Found on Matang Mountain. The following Bornean species are also described by Mr. Ridley as resiniferous, viz.:—*D. mattaniensis*, Becc., *D. molleyi*, Becc., *D. sparsiflorus*, Becc., to which may be added *D. ruber*, Bl., of Java.

Of the above mentioned, *D. micranthus*, *D. propinquus*, *D. Draco*, and *D. Draconcellus*, are all known to the Malays as Rotan Jerenang, and are the source of the greater part at least of the Dragon's Blood of commerce. The remainder are probably also used, but we have no facts at present by which to settle this point.

For the subjoined particulars regarding the trade in Dragon's Blood we are mainly indebted to Messrs. Jenkin & Phillips, Mincing Lane, E.C.

The gum as it is known in commerce is imported in three forms (1) in lump or saucer, (2) in reeds, (3) in drop.

The lump or saucer Dragon's Blood comes from the Malay Peninsula in blocks weighing 7 to 14 lbs. done up in bags, and packed in cases of about $2\frac{1}{2}$ cwts. It is shipped from Singapore, and varies very much in quality. It ranges in price from £6 to £10 per cwt., or may be considerably more according to the demand for the time being.

Reed Dragon's Blood is imported in sticks wrapped in leaves, usually those of a species of *Licuala*. This also comes from Singapore packed in cases. As a rule "reed" is not of so good a colour as "lump," though by some buyers it is the kind preferred. The present price is £8 15s. to £10 per cwt.

Drop Dragon's Blood consists of loose tears known as "Bombay Drop" or as "Zanzibar" Dragon's Blood. This kind is of very inferior quality, consisting chiefly of very dark gum of poor colour. Drop Dragon's Blood is generally imported in cases of 3 cwt. nett. Its value varies from 20s. to 65s. per cwt. The substance known

as Drop Dragon's Blood is not derived from a *Daemonorops*; it is not indeed a product of the natural family *Palmaceae*, but is obtained from two species of *Dracaena*, *D. schizantha*, Baker, and *D. cinnabari*, Balf. f., respectively, nat. family *Liliaceae*.

Samples of these products are exhibited at Kew in Table-case C, Room No. I., and in Case 45, Room No. IV., in Museum No. II.

J. M. H.

XXXIII.—OGEA GUM.

(*Daniella* and *Cyanothyrsus*, Spp.)

In a letter addressed to the Royal Gardens, dated Lagos, April 13th, 1883, Captain (now Sir Alfred) Moloney, a valued correspondent of Kew, drew attention to this product. Accompanying the letter were herbarium specimens of an Ogea tree, together with a transverse section of the stem and samples of the resin.

This tree abounds in the Yoruba country, where it is known as Ogea, the Popo name being Ujea. It is generally found in swampy situations and is subject to the attacks of wood-borers, which readily cause the resin to exude. This is collected by the natives, who employ it for fires and for lighting, and as it is of a fragrant nature it is powdered and used by native women as a body perfume.

Samples of the hard fossilized resin or copal which had been dug from the ground were submitted to Mr. R. Ingham Clark, of the West Ham Abbey Varnish Works, Stratford, who found upon examination that they had a melting point of 420° Fahr., but that it required a heat of 600° Fahr. to melt them to a sufficiently liquid state to enter into complete partnership with linseed oil for the preparation of varnish.

The herbarium material forwarded by Capt. Moloney proves to belong to *Daniella thurifera*, Benn., described in *Pharmaceutical Journal*, Vol. 14, 1855, p. 400, but not to the species afterwards figured under this name in Hooker's *Icones Plantarum*, Vol. 25, t. 2406.

D. thurifera, Benn., is known as the Frankincense tree, and also as Bungo or Bungbo in Sierra Leone, where the fragrant resin obtained from it is sold in the native markets for use as incense and as a body perfume. A full and interesting account of this product by Dr. Daniell appeared in the *Pharmaceutical Journal* in the article referred to above, wherein also occurs a reference to Ogea. Recently further herbarium specimens of Ogea have been received from the Department of Forests and Agriculture, Lagos, which evidently belong to another genus, viz., *Cyanothyrsus*, which is nearly allied to *Daniella*. In this case the material sent is insufficient to name the plant specifically.

The Museum also contains other specimens of what is noted as Ogea Gum from Yoruba-land, the Gold Coast, and Southern

Nigeria. All of these differ in character from the gums mentioned above. They are believed to be derived from one or more species of *Cyanothyrsus* so far undetermined. It is therefore much to be desired that further examples of these resins, together with complete herbarium specimens of the trees furnishing them, should be forwarded to Kew to enable them to be specifically determined.

A previous reference to this product was made in the *Kew Bulletin* for August, 1891, p. 207.

J. M. H.

XXXIV.—DECADES KEWENSES

PLANTARUM NOVARUM IN HERBARIO HORTI REGII
CONSERVATARUM.

DECAS XLII.

411. *Astragalus brevidentatus*, C. H. Wright [Leguminosae-Galegeae]; *A. bolivianus*, Phil., quem simulat, calycis dentibus brevissimis differt.

Caulis procumbens, teres, pilosus. *Folia* circa 12-juga, dense sericea; foliola elliptica, obtusa, 6 mm. longa, circa 3 mm. lata; stipulae in unam oppositifoliam connatae, scariosae, acutae, 4 mm. longae. *Pedunculus* 4.4 cm. longus, pilosus; racemus 1.6 cm. longus; pedicelli vix 2 mm. longi; bracteae pedicellis paullo breviores, triangulares, scariosae. *Calyx* sericeus, 2 mm. longus; dentes brevissimi, subulati. *Corolla* lutea (?); vexillum obovato-lanceolatum, 1 cm. longum, 5 mm. latum. *Ovarium* sessile.

GALAPAGOS ISLANDS. Without collector's name, received from M. Decaisne, 1844.

Astragalus Edmonstonei, Robinson (*Phaca Edmonstonei*, Hook. f.), is synonymous with *Astragalus flavus*, Reiche (*Phaca flava*, Hook. et Arn.). The calyx of the latter is densely hairy, not "glabriusculus" as originally described.

412. *Gurania Eggersii*, Sprague et Hutchinson [Cucurbitaceae-Cucumerineae]; affinis *G. coccineae*, Cogn., foliis magis lobatis, calycis dentibus brevioribus, antheris rectis ab ea recedit.

Ramuli sulcati, sparse villosi. *Folia* pedatifida, ambitu sub-orbicularia, lobis 5 obovatis vel oblanceolatis (medio interdum trilobato), acute acuminatis basin versus sensim angustatis 9–15 cm. longis 3.5–7 cm. latis, margine denticulata, denticulis circa 0.5 mm. longis 0.5–3 cm. distantibus, membranacea, in venis utrinque villis puberula, ceterum glabra; venae laterales utrinque 7–8; petiolus 6–8 cm. longus, anguste alatus, costatus, sparse villosus vel glabrescens. *Flores masculi* 8–24 in racemum brevem corymbosum longipedunculatum dispositi; pedunculus gracilis, sulcatus, 15–17 cm. longus, glabriusculus; pedicelli sparse pilosi, usque ad 6 mm. longi. *Calycis* tubus ovoideus,

circa 6 mm. longus, 2 mm. diametro, extra pilosus, intus glaber; lobi erecti, lineari-subulati, acuti, 2-2.5 mm. longi, extra sparse pilosi, intus glabri. *Petala* erecta, lanceolata, obtusa, 1.75-2 mm. longa, 0.75 mm. lata, dense papillosa. *Antherae* rectae, oblongae, circa 3.5 mm. longae, connectivo angusto, appendicula obtusa papillosa circa 0.4 mm. longa. *Inflorescentia feminea* rhachi angulato-flexuosa circa 25 cm. longa, floribus solitariis alternis 2.5-4 cm. distantibus, pedicellis usque ad 5 mm. longis. *Ovarium* subcylindricum, circa 2 cm. longum, glabrum. *Calyx* glabriusculus; tubus circa 1 cm. longus, 3-4 mm. diametro; lobi deltoidei, acuminati, leviter reflexi, 1.5-2 mm. longi, basi circa 1.5 mm. lati. *Petala* ovato-oblonga, obtusissima vel acuminata, 3-3.5 mm. longa, 1.75-2 mm. lata, dense papillosa. *Stylus* per 6 mm. indivisus, ramis intus stigmatosis circa 8 mm. longis 1.5 mm. latis apice rotundatis. *Fructus* desunt.

ECUADOR. *Eggers*, 15496.

According to Cogniaux's key to the species of *Gurania* (in DC. Monogr. iii. 679), *G. Eggersii* should come near *G. macrophylla*, *kegeliana* and *klotzschiana*, which agree with it in having straight anthers, narrow connective and papillate appendix, but the closest affinity seems to be with *G. coccinea* and *G. parviflora*, which differ from it in having the anthers *replicate* at the base.

413. *Gurania phanerosiphon*, *Sprague et Hutchinson* [Cucurbitaceae-Cucumerineae]; a vera *G. eriantha*, Cogn., corollae tubo insigni facile distinguitur.

Ramuli graciles, valde costati, ut pedunculi et longe patenter sparsiuscule villosi et pilis brevibus crispulis inter costas puberuli. *Folia* late ovata, acute acuminata, basi satis alte cordata, 11-16 cm. longa, 7.5-12 cm. lata, tenuiter membranacea, ciliata, minute denticulata, denticulis subulatis patentibus 5-10 mm. distantibus, utrinque breviter sparse appresse inconspicue villosa, basi pedatim 7-nervia; nervi laterales superiores utrinque 3; petioli circa 4 cm. longi, dense longe villosi, crispule pubescentes. *Inflorescentia mascula* spicata, longipedunculata; pedunculus circa 25 cm. longus; rhachis circa 3 cm. longa, dense villosa, minute crispule pubescens. *Calycis* tubus ovoideo-globosus, intus 6 mm. longus, circa 4 mm. diametro, extra dense villosus; lobi subulati, 16-18 mm. longi, basi 1.5-2 mm. lati, extra longe patulo-villosi, intus inferne villosi, superne glabriusculi. *Corollae* tubus 4-5 mm. longus, extra tomentellus, intus glaber; lobi lineares, subquadrangulares, obtusi, 8-10 mm. longi, 0.75 mm. lati, ubique pilis moniliformibus dense tomentelli, extra pilis longioribus formae solitae ornati. *Antherae* late ovatae vel ellipticae, 3-3.5 mm. longae, 2.5-3 mm. latae, inappendiculatae, loculis basi incurvatis, connectivo 1.5-2 mm. lato. *Planta feminea* ignota.—*G. eriantha*, Cogn. in DC. Monogr. Phan. iii. 683, *partim*, non *Anguria eriantha*, Poepp. et Endl.

ECUADOR. Forest near Archidona, *Jameson*.

414. *Peracarpa luzonica*, *Rolfe* [Campanulaceae-Campanuleae]; a *P. carnosae*, Hook. f. & Thom., foliis duplo minoribus, pedunculo folia saepissime multo excedente distincta.

Herba subprostrata, ramosa, nana, 5–8 cm. alta. *Rami* graciles, glabri, subflexuosi. *Folia* petiolata, ovata, apiculata, crenata, 4–10 mm. longa, 3–7 mm. lata; petioli 2–6 mm. longi. *Pedunculi* graciles, 0.6–2 cm. longi. *Calycis* tubus 1 mm. longus, ovario adnatus; lobi triangulares, subobtusiusculi, 0.5 mm. longi. *Corolla* alba, campanulata, 1.5 mm. longa, 5-partita; lobi lanceolato-oblongi, subobtusiusculi. *Stamina* 5; antherae lanceolatae, 1 mm. longae; filamenta aequilonga. *Fructus* ellipsoideus, circa 3 mm. longus.

LUZON. Prov. Benguet: Mt. Data, at about 2220 ft., *Loher*, 3735; Pauai, at bases of trees in mossy forest, at 2040 ft., *Merrill*, 4724.

A very interesting addition to the Philippine Flora, as *P. carnosa*, Hook. f. & Thom., the only species hitherto known, is a native of the mountains of Northern India, from Kumaon to Sikkim, Khasia and Manipur, and has recently been detected in Yunnan by Dr. Henry. The Philippine plant is much smaller in every respect.

415. *Cynoglossum amabile*, *Stapf et Drummond* [Boraginaceae-Borageae]; affinis *C. furcato*, Wall., a quo floribus paulo maioribus amoene coeruleis, antheris altius insertis, nuculis magis erectis, glochidiis brevioribus basi saepe confluentibus recedit.

Herba perennis ad 60 cm. alta, undique griseo-pubescentia vel hirsutiuscula. *Caules* teretes, infra inflorescentias simplices. *Folia* basalia in petiolum 4–2 cm. longum attenuata, lanceolato-elliptica, utrinque acuta, 5–10 cm. longa, 2–3.5 cm. lata, caulina sessilia, oblonga vel lanceolata, acuta, basi rotundata, saepe undulata, majora ad 10 cm. longa, ad 2.5 cm. lata. omnia dense tenuiterque molliter pubescentia vel subvelutina, nervis secundariis duplo arcuato-connectis subtus uti costa magis minusve albicantibus vel cinerescentibus. *Racemi* ex axillis foliorum sursum cito decrescentium superne in paniculam laxam collecti, inferiores pedunculis 2-foliatis, superiores pedunculis nudis suffulti ad 3 cm. (rarius ultra) longi, robustiores 2-pari; pedicelli sub anthesi vix 2 mm. longi, demum elongati (ad 4 mm.) et nutantes. *Calyx* ad 3 mm. longus, cinereo-pubescentia; sepala ovata, subacuta. *Corolla* amoene coerulea; tubus ad 2.5 mm. longus; limbus patens, 7–9 mm. diametro, fauce fornicibus papillosis retusis instructus, segmentis rotundatis. *Antherae* inter fornices breviter protusae, 1 mm. longae; filamenta brevissima. *Nuculae* ambitu ovatae, in dorso depressae, oblique erectae, 3 mm. longae, 2–2.5 mm. latae, albicantes, ubique glochidiis brevibus basin versus incrassatis et interdum confluentibus obsitae, glochidiis marginalibus fere in cristam dispositis, gynobasi gracili inferne subito dilatatae adnatae, areola ovata in dimidio nuculae superiore sita.

CHINA. Yunnan, Mengtze, *Hancock*, 133; Szemao, 1350 m., *Henry*, 9365. Szechuan, Tatsienlu, Soulié, 861; 2700–4050 m., *Pratt*, 887; without precise locality, cultivated and communicated by *Max Leichtlin*.

According to *Hancock*, this plant covers the plains near Mengtze in large patches "absolutely blue, like lakes." A white flowering form was collected by Dr. *Henry*.

416. *Euterpe Jenmanii*, C. H. Wright [Palmae-Oncospermeae]; *E. ventricosae*, C. H. Wright, proxima, caule minus ventricosus et fructu nigro differt.

Caulis erectus, 6-9 m. altus, leviter ventricosus. *Foliorum* rhachis triangularis, laevis; foliola lineari-lanceolata, acuminata, 75 cm. longa, 2.5 cm. lata, nervis circa 10 tenuibus. *Panicula* dense ramosissima; ramuli ultimi teretes, glauci, floribus dense vestiti. *Flores* ♂: sepala subreniformia, imbricata, 1 mm. longa; petala oblongo-lanceolata, 4 mm. longa, 2 mm. lata; stamina 6; filamenta compressa, petalis aequilonga; antherae dorsifixae, sagittatae; ovarii rudimentum parvum, trilobum. *Flores* ♀: sepala valde imbricata, transverse oblonga, 1.5 mm. longa, 3 mm. lata, scariosa; corolla 3.5 mm. longa, lobis 3 triangularibus acutis valvatis tubo aequilongis; staminodia connata, corollae tubo adnata, lobis triangularibus obtusis; ovarium oblique ovoideum; stigma excentricum. *Drupa* globosa, 8.4 mm. diam., exsiccata nigra.

BRITISH GUIANA. Georgetown, *Jenman*, 2057.

417. *Euterpe ventricosa*, C. H. Wright [Palmae-Oncospermeae]; *E. acuminatae*, Wendl. (*Enocarpus utili*, Klotzsch), affinis sed ramis, ultimis inflorescentiae teretibus glaucis, florum masculorum sepalis multo minoribus suborbicularibus.

Caulis erectus, 6-9 m. altus, medio ventricosus circa 7.25 dm. diam. *Foliorum* rhachis triangularis, glabra; foliola oblongo-lanceolata, ad 12 dm. longa, 4.4 cm. lata, circa 12-nervia. *Spadix* ramosissima; ramuli ultimi 2.25 dm. longi, 2 mm. lati, teretes, glauci, floribus dense vestiti. *Flores* ♂: sepala suborbicularia, imbricata, 1 mm. longa; petala oblonga, subacuta, valvata, 4.7 mm. longa; filamenta petalis breviora, compressa; antherae dorsifixae, cellulis basi divergentibus; ovarii rudimentum parvum, trigonum. *Flores* ♀: sepala late deltoidea, obtusa vel nonnunquam mucronulata; corolla trilobata, 3 mm. longa; lobi late triangulares, tubo dimidio breviores; staminodia 6, connata, corollae tubo adnata, lobis rotundatis; ovarium oblique ovoideum. *Drupa* globosa, 6.3 mm. diam., brunnea.

BRITISH GUIANA. Cultivated in the Botanic Gardens, Georgetown, *Jenman*, 7574.

418. *Dichelachne brachyathera*, Stapf, [Gramineae-Agrostideae]; affinis *D. sciureae*, Hook. f., sed spiculis minoribus, glumis magis inaequilongis, arista multo brevior, antheris brevibus diversa.

Gramen caespitosum, perenne, glabrum. *Culmi* graciles, 4-nodi, internodiis e vaginis exsertis. *Foliorum* vaginae subarctae vel summa superne dilatata, magis minusve asperulae; *ligulae* membraneae late ovatae, 3 mm. longae; laminae lineares, apice longe acutatae, acutissimae, inferiores ad 35 cm. longae, ad 7 mm. latae, planae, virides, scaberulae, nervis lateralibus (secundariis) utrinque 3. *Panicula* contracta, linearis, 15 cm. longa, paulo ultra 1 cm. diametro; internodia inferiora 3-2 cm. distantia; rami fasciculati, 5-3-nati, valde inaequales, longiores ad 5 cm. longi et ad 8 mm. indivisi, breviores ab ima basi divisi; ramuli (rami secundarii) fasciculati, ad 1.5 cm. longi, racemosi; pedicelli 1.5-0.5 mm. longi. *Spiculae* lanceolatae, 4-5 mm. longae;

viridescentes. *Glumae* anguste lanceolatae, acute tenuiterque acuminatae, praeter margines albido-hyalinos virides, carina asperula, inferior paulo brevior, 1-nervis, superior 3-nervis. *Valva* lanceolata, acutissima, minute bifida, glumam superiorem subaequans, circiter 1 mm. infra apicem aristata, minutissime asperula, 5-nervis, nervo exteriori submarginali, ima basi (callo) minute barbata; arista 4-5 mm. longa subflexuosa a medio magis minusve recurva. *Palea* tenuis, 2.5-3 mm. longa, carinis superne asperulis. *Antherae* late oblongae, 0.5-0.7 mm. longae. *Stigmata* delicate plumosa, 1-1.5 mm. longa.

AUSTRALIA. New South Wales: Blue Mountains, Mt. Wilson, swamp at the head of Waterfall Gully, *Gryson*.

Diandrolyra, *Stapf*, gen. nov. [Gramineae-Olyreae]; ex affinitate *Olyrae*, sed differt spiculis geminatis inferiore feminea, superiore mascula distincta; spiculis masculis glumis 2 praeditis in inferioribus minutis in terminali valvam aequantibus; flore masculo 2-andro cum pistillo rudimentario bene evoluto; flore femineo cum staminodiis minimis 2.

Spiculae unisexuales, praeter summam masculam geminatae, inferior uniuscuiusque paris feminea, superior mascula, in racemum compositum spiciformem dispositae. *Spiculae masculae* cum pedicello articulatae, totae deciduae, ramulorum ovato-lanceolatae; glumae minutae, squamiformes, minutissime puberulae, hyalinae; valva membranacea, tenuiter 3- vel sub-5-nervis, parce transverse venulosa; palea quam valva paulo brevior, 2-carinata; lodiculae 3, carnosulae; stamina 2 (anticum suppressum); pistilli rudimentum perfecto simili sed basi tenui, stylo indiviso, stigmatibus confluentibus; spicula mascula terminalis lanceolata; glumae magis minusve aequales, valva vix breviores, 3-nerves, caetera ut in spiculis ramulorum. *Spiculae femineae* cum pedicello articulo si haud fecundatae totae deciduae, ovoideo-oblongae, breviter cuspidato-acuminatae, virides, puberulae; glumae herbaceae, aequales, valvam paulo superantes, sub 7-nerves, transverse venulosae, basi cum rhachilla in stipitem brevem crassiusculum connatae; valva oblongo-elliptica, acuta, pergamentacea, demum indurata, pallida, tenuissime 5-nervis, laevis; palea 2-nervis, valvam aequans et structura simillima; lodiculae 3, truncatae, carnosae; staminodia 2, minutissima, cylindrica, lateralia (anticum nullum); ovarium ovoideum in stylum filiformem apice divisum abeuns, stigmatibus plumosis sub apice anthoecii exsertis. *Caryopsis* ellipsoidea, libera; *Embryo* minutus.

419. *D. bicolor*, *Stapf* (spec. unica).

Gramen perenne, dense caespitosum. *Culmi* erecti, tota fere longitudine vaginati, parte terminali exserta pubescente florentes 1-3- (rarius pluri-) foliati 4-8 cm. alti, steriles 5-8-foliati, 10-20 cm. alti. *Folia* infima ad vaginas redacta, sequentes perfecta vel 1-2 intermedia (*i.e.*, lamina parva ovata); vaginae arctae, striatae, tenuiter puberulae nisi superne pubescentes vel partibus obtectis glabris, ore obtuse subauriculatae vel truncatae; ligula vix ulla; lamina lanceolata vel lanceolato-oblonga, basi rotundata, abrupte in petiolum 1 mm. longum pubescentem contracta, 6-9 cm. longa,

1-1.5 cm. lata, apice tenuiter acutata, plana, supra saturate viridia, costa basi calloso-incrassata supra tenui percursa, tenuiter striata, laevis nisi secundum margines asperula, infra violaceo-purpurea, asperula, nervis secundariis utrinque 3 prominulis, venis transversis nullis. *Inflorescentia* terminalis, 1.5 cm. longa, angusta, subsecunda, folio summo superata spicularum paribus 4-5; ramuli adpressi, ad 3 mm. longi, uti rhachis semicylindrica, sublaeves vel superne asperuli. *Spiculae masculae* 5 mm. longae, inferiorum gluma inferior 1-1.5 mm. longa, lanceolata vel ovata, magis minusve acuta, superior minor; antherae vix 1 mm. longa; pistillum rudimentarium antheras paulo superans. *Spiculae femineae* 6 mm. longae; valva 5 mm. longa, laevissima.

Native country unknown. Raised at Kew from seeds communicated by Messrs. Sander & Son.

The blades of vertical stems are more or less at right angles to the medium plane, of inclined stems more or less inclined, and if more than two or three, distinctly distichous. The uppermost blade is obliquely erect and more or less in the continuation of the stem with the inflorescence facing the green upper side. When the fruits have begun to set, the blade of the uppermost leaf turns on the petiole until it has come round the inflorescence so that its purple underside faces the fruits. As the leaf-margins curl back at the same time the infructescence becomes loosely enclosed and hidden by the blade.

420. *Selaginella* (*Stachygynandrum*) *Tansleyi*, *Baker* [*Selaginellaceae*]; ad *S. plumosam*, *Baker*, magis accedit; differt caule parce ramoso, foliis majoribus haud contiguis ovatis basi haud ciliatis, foliis minoribus conspicue aristatis, bracteis obtusis.

Caules continui, decumbentes, remote ramosi, subpedales, ramis ascendentibus brevibus simplicibus vel breviter ramosis. *Folia majora* ovata, nitidula, viridia, 2 mm. longa, ad latus superius magis producta, basibus haud ciliatis utrinque late rotundatis. *Folia minora* ascendentia, ovata, conspicue aristata, foliis majoribus duplo breviora. *Spicae* 12-18 mm. longae, 2 mm. diam.; bractee erecto-patentes, conformes, obliquae, ovato-lanceolatae, obtusae.

MALAY PENINSULA. Perak or Selangore, *A. G. Tansley*.

XXXV.—SYDNEY BOTANIC GARDENS.

Mr. J. H. Maiden, Director of the Sydney Botanic Gardens, has given in the *Sydney Morning Herald* an interesting and very valuable account of the origin of the Gardens and of their history during the early half of the last century. The first instalment of this sketch appeared in the issue of the journal for April 21; it was concluded in the issue for May 23, 1906. With the object of rendering it more generally known, the sketch is reprinted here. The history of the Gardens subsequent to January, 1848, the date to which present account brings us, which Mr. Maiden hopes at some future date to write, will be looked forward to with much interest.

"SYDNEY BOTANIC GARDENS.

"If it be stated that the Botanic Garden of Sydney is one of the oldest in the world, it may be thought to be harmless exaggeration. That of Oxford is older, Kew is older, some of the older Italian gardens have been styled Botanic, and have done botanical work fitfully. But Sydney is senior to that of Cambridge, Edinburgh, all the official American gardens, and many others. Furthermore, as a combined botanical and horticultural establishment that of Sydney is, by common consent, admitted to the front rank of the world's institutions.

"It has grown with New South Wales, and its growth has been so gradual that a certain amount of research has been necessary to ascertain certain facts in its development.

"The colony was founded on January 26, 1788. Governor Phillip had collected both at Rio de Janeiro and at the Cape many economic plants, while he had brought wheat and other cereals from England. Simultaneously with finding shelter for his people he set apart land for a farm and garden. This was the site of the present Botanic Garden and the origin of the name Farm Cove, on which it abuts.

"The creek which runs through the Garden and which is made as rural as possible under the circumstances, is the stream marked on Governor Phillip's first plan, and doubtless was the cause of the farm being chosen where it is. His first plan is marked 'a farm, nine acres in corn,' and six months later we have the note, 'six acres of wheat, eight of barley, and six of other grain.'

"Some time after 1790 the Governor gave Nicholas Devine a permission occupancy of a portion of land at Farm Cove, and there is a notice in the 'Sydney Gazette' in 1803 regarding a theft of 'apple-tree plants' from this early horticulturist.

"The 'Scotch Martyrs,' Muir, Palmer, Skirving, Gerald, and Margarot, were transported for what we should at the present time call the expression of moderate political opinions. This was in 1794. Gerald purchased or leased a piece of land in the Botanic Gardens, built a house and formed a garden, where he died in March, 1796. Tradition has it that he was buried in his garden, between the wishing tree and the creek, but I have no evidence, and the precise site is unknown.

"In the earliest days the farm or garden was primarily to replenish the Government stores with grain, and also to supply the Governor and the officers with fruit and vegetables. At least as early as 1806 it was alluded to as the Government Garden. By this time British oaks had fruited in the infant colony, and 'the gardener will have instructions to supply those who may be approved.' So that a century ago the place had become differentiated from a farm into a garden. The fact is that partly because of the innate sterility of the land, and partly because the cereal crops were attacked by rust, it became impossible to cultivate these necessities of life at Farm Cove, which accordingly were

grown at Parramatta and the Hawkesbury. But the impress of the old ploughed fields is still left in the Botanic Gardens in the shape of the large oblong beds which, at the present day, mainly compose the Middle Garden. These were simply wheat and barley fields and vegetable gardens, and when the farm evolved into a garden it was sufficient to make paths parallel to and at right angles to the old furrows. After the cereals had disappeared, vegetables, small fruits, and orchard succeeded, and the wishing tree was planted (in 1817) at the intersection of paths.

"The attention that had been given in Europe to the remarkable vegetation of New Holland caused the directors of botanical establishments and proprietors of nurseries to compete eagerly for seeds and plants of this country. Sydney had practically a monopoly of such productions, and hence it came about that cases of plants were consigned to the Botanic Gardens of Sydney by almost every ship. Economic plants were most sought for in Sydney as an exchange, but other interesting and beautiful plants poured in. The early superintendents (as they were then called) endeavoured to set out the plants they received, according to methods of classification, but the variety was such that this grouping had to be abandoned. At the present day, however, the horticulturist or botanist can still see, for example, how the Oleaceae (Jasmine or Olive family), the Araliaceae, the Sterculiaceae were planted together in those early days.

"Governor Bligh was fond of gardening. We read that in 1807 'the shrubbery has also undergone a thorough change—no grass now growing in it, all laid out in walks, with clumps of trees.' Government House was then at the corner of Bridge and Phillip streets, with a fronting to Farm Cove. The solitary remaining tree of the old Government House avenue of a century ago is an oak in Phillip Street, opposite the Civil Ambulance Brigade, near the Water Police Court. The telegraph people hack at it every now and then, and this (perhaps the oldest) relic of the Government Garden in Sydney, should be placed in my charge before it is too late. There used to be ten or a dozen stone pines just west of old Government House; one of them stood in Bridge Street up till about 30 years ago.

"At this time, in a map by Meehan (assistant surveyor), the native name of Farm Cove is given as Wöccanmagully. This map showed leases in the present Botanic Gardens, in addition to Devine's, but these were shortly afterwards revoked.

"Heward, the friend and executor of Allan Cunningham, later on King's Botanist, and afterwards Superintendent of the Botanic Gardens, informed Hooker that the Sydney Botanic Garden was 'probably founded shortly after Governor Macquarie's arrival in 1809,' but I will show presently that a somewhat later date is the correct one.

"In the year 1813 the Mrs. Macquarie's Road, referred to in the inscription on Mrs. Macquarie's Chair, was commenced. This road was of a total length of three miles and 37 yards, probably measured from the Obelisk in Macquarie Place. The road encircled the Domain, as then defined, and from the chair to old

Government House gates it passed through the present garden, *e.g.*, from the vicinity of Mr. Overseer Camfield's present house, along the north side of the old stone wall. The old stone wall had therefore been constructed some time prior to the year 1813—I do not know the precise date. Mrs. Macquarie's Road was finally completed on June 13, 1816. Besides the chair, the inscription 'Mrs. Macquarie's Road, 1816,' may still be seen on a rock on the left-hand side of the road up the slope after leaving Palmer's baths.

"The completion of Mrs. Macquarie's Road and its record on the chair was, I consider, the coping-stone of Macquarie's plans for the definition of the Garden and Domain. He then appointed a superintendent to supervise the area which he had thus defined.

"Mrs. Macquarie's chair is, therefore, the true foundation-stone of the Botanic Gardens; the date (June 13, 1816) inscribed on it is the official birthday of the Botanic Gardens. In about 10 years, therefore, we shall arrive at the centenary of the Sydney Botanic Gardens, and I hope that one way of commemorating it will be by the issue of an illustrated historical volume.

"Incidentally, I may remark that 1816 is an important year to us for another reason, since on December 21 Allan Cunningham landed in Port Jackson.

"Part of Mrs. Macquarie's Road is lined by swamp mahogany trees (*Eucalyptus robusta*). These line the north side of the wall from the aviary entrance to the main avenue entrance.

"Other trees along this Macquarie Road are the British oaks, from the main Domain entrance opposite the Public Library along the back of the hospital wall, at least as far as the St. Mary's entrance to the Domain.

"It is stated that these trees were planted by a Mr. Bigg, of Governor Macquarie's orders; and the story goes that Bigg, having a number of oaks to plant, had one over, and planted it in front of his house in Phillip Street. This was the tree growing in the path in front of the office of the Inspector-General of Police for so many years, and cut down while in full vigour only a few years ago. Messrs. Charles and George Kellick, who were born in Phillip Street, obtained the history of these plantings from their father, who knew Bigg well.

"In 1816 the first Superintendent of the definitely constituted Botanic Garden, with the title 'Colonial Botanist,' was appointed by Governor Macquarie in the person of Charles Fraser, a soldier of the 46th Regiment, who in the following year went with Allan Cunningham to collect plants and seeds on Surveyor-General Oxley's journey of exploration to the west.

"Let me digress for a moment. It is the fashion of Sydney people to speak of the Botanic Gardens in the plural, and this is how it came about:—The original garden, which we now know as the middle garden, was bounded on the north by the picturesque old stone wall, on the east by the aviary, on the south by the hothouse avenue, and on the west by the creek. The upper garden was formed partly by taking in land from the Domain and

partly by absorbing the site of the old house and grounds of the director. The lower garden was formed by enclosing and bringing into cultivation that portion of land between the middle garden and Farm Cove.

"In the year 1817 Mrs. Macquarie had a Norfolk Island pine (raised from seed by Major Antill, it is stated) which had got too large for the gubernatorial garden. She gave orders for it to be planted in the Government or Botanic Garden. It was placed in the middle or intersection of paths of the middle garden, and forms what is now known as the 'Wishing Tree.' Said designation was given because the custom grew up amongst the damsels of Sydney of walking three times round this tree when all their wishes would be gratified, and they would be happy.

"The tree is about 100 ft. high, and it would appear to have now reached its maximum growth. Quite a number of candidates have claimed the honour of planting that tree. The late Mr. J. M. Antill stated that his father, Major Antill, 73rd Regiment, Aide-de camp to Governor Macquarie, planted it. Mr. Charles Fraser, the Superintendent of the Garden, is also credited with this honour. Ned Shakeley, a prisoner, afterwards employed by Mr. J. Baptist in his gardens at Surry Hills, was also stated to have been the planter; and a friend of mine told me that Mr. John Higgerson (the well-known Assistant Ranger of the National Park, who died last year), told him that he 'had a hand' in planting this tree. Now, I propose to adjust these claims in the following manner:—Ned Shakeley dug the hole, Johnny Higgerson handed him his spade and helped him generally, Mr. Fraser turned the plant out of the pot to see that it was all right, and Major Antill planted it with due ceremony. Then Mr. Fraser trod the earth about it, staked it, watered it, and tended it during its early days. And I have no doubt that the irascible Governor Macquarie, when the tactful Mrs. Macquarie had got him into one of his good humours of which tradition speaks, said one day:—'And now we will go and see that little pine, my dear, which Antill tells me he has planted.'

"The 'wishing tree' is the most historically interesting plant in our beautiful Garden. Considering the rich soil which such pines require in their native Norfolk Island, its development in such a sterile situation affords a remarkable example of adaptability to environment. I often stand at that spot, contemplate Macquarie, and think of the marvellous changes around me in the Garden in the course of less than a century!

"Tradition states that Fraser, who was known to have a good knowledge of horticulture and a scientific acquaintance with botany, acquired his knowledge in some of the best establishments in Scotland. His various explorations in New South Wales, Queensland, and Western Australia in the first decades of the last century enriched these Gardens with many notable plants.

"The five voyages, which included the circumnavigation of Australia undertaken by Captain P. G. King, R.N., in the twenties, with Allan Cunningham as King's Botanist, was the means of introducing to Sydney many Australian plants not previously in

cultivation. The many journeys of exploration undertaken by Allan Cunningham resulted in fine collections of fruits and seeds being brought to Sydney.

"During the year 1827 we find quite a crop of notices in the *Sydney Gazette* concerning the Botanic Gardens. It is announced that a pitcher-plant (*Cephalotus*) had been discovered at King George's Sound, and that specimens are in the Botanic Gardens. That the gates are to be closed except to the military (September 26). That an olive tree six years old was bearing flowers; and that cotton grown in the Gardens was sent to Glasgow (presumably to the elder Hooker, for report). A list of fruits cultivated in the Sydney Botanic Gardens was published in the *Gardeners' Magazine* of London of that year.

"The Sydney Botanic Gardens have, apart from their aesthetic and hygienic aspects, been intimately bound up with the material welfare of the colony. The establishment has a most honourable record of service in regard to the introduction of useful plants into Australia. Much of this work has, of course, been rendered for many years unnecessary by reason of the establishment of so many reputable firms of seedsmen and nurserymen. The Sydney Botanic Gardens has also laid the foundations of the grand work now undertaken by the Departments of Agriculture of the various States, much of it, of course, entirely beyond the scope of a modern botanic garden. The Sydney Botanic Garden is classic ground. Its area includes, as has already been shown, the site of the first farm, where corn was grown for the infant colony, where fruit trees of all kinds—apples, oranges, olives, vines, bananas—were first acclimatised, where it was shown that the cotton and innumerable economic plants could grow in New South Wales, while by means of Wardian cases and glasshouses, it was the means of establishing and propagating valuable tropical economic plants for what is Queensland, Northern Australia, and Polynesia; such plants were chiefly obtained from the islands of the Pacific, Batavia, Calcutta, and London. The methods and objects of the Sydney Botanic Gardens have changed with the necessities of the times, but I say, without fear of successful contradiction, that the institution now more deserves the title of 'botanic' than at any other period of its existence.

"Not only was the Sydney Botanic Garden engaged in the propagation and exchange of plants, but seeds, cuttings, rooted plants, etc., were extensively supplied in the late twenties to 'Brisbane Town.' Plants so propagated were not only distributed to public institutions, but to such private and official persons as the Governor might see fit to direct.

"In the year 1828 (July 11), Fraser was addressed by the Colonial Secretary as the 'Superintendent, Botanical Garden.' They were rather easy-going in those days, and he was officially designated indifferently in addition 'Colonial Botanist,' and sometimes 'Superintendent, Government Garden.' On one occasion he signs himself 'H. M., Bot. Collector.'

"On June 8, 1829, the *Sydney Gazette* contained an official description of the Domain and Botanic Gardens, from which it will

be seen how much less in area the Domain is now to what it formerly was. I may mention that in the year 1811, Garden Island was declared to be a portion of the Domain.

"In 1829, the Garden was more accurately defined than heretofore, additions were made to it, and the whole fenced. A plan of the Garden at this period is in existence.

"During 1830 the experiment was tried of employing orphan boys (in care of the State) in the Botanic Gardens, but it was not a success, and the experiment came to an end in three or four years.

"In July of this year, Mr. Fraser made the first annual report of which I have any record. The operations were even then of some magnitude, cases of seeds and of living plants being sent to a number of Botanic Gardens in various parts of the world, and also to certain distinguished individuals. Of herbarium specimens the Regius Professor of Botany (W. J. Hooker), at Glasgow, was the principal recipient, and he received 1,800.

"In May of this year it was announced that Mr. Fraser had a cutting of the weeping willow which grew over Napoleon's tomb at St. Helena, and that it was planted on one of the miniature islands constructed by him in the pond in 'the new botanic gardens which he is laying out at Farm Cove.' I believe this island to be that on which Cunningham's monument stands, and the willow in question may be that on the bank just to the north of the island. At all events, all the weeping willows in the vicinity of this pond and most of them in other parts of the Garden are descendants of Napoleon's willow.

"The laying out undertaken by Fraser refers to the land outside the stone wall which bounded the existing garden (which is now known as the middle garden) and the sandy beach (as it was then) of Farm Cove. This new area, now known as the lower garden, was laid out by Fraser, and there is a plan in existence, signed by Major Mitchell, the Surveyor-General, in 1833, showing that the laying out was practically as it exists at the present day. In those days the tide used to come up to near Cunningham's monument, but in 1869-70 the land between tides was reclaimed, and the substantial semicircular stone wall which exists round Farm Cove was erected.

"Fraser's alterations, instigated by the Governor, were very considerable, and were in progress in 1830-1.

"A new walk approved by his Excellency was 1,600 yards in length. 'The above distance will admit a walk through the centre on high ground from its southern to its northern extremity, passing over the carriage road at Mrs. Macquarie's Chair, and entering the bush on the western side of the road. It will then meander through those Roman rocks facing Farm Cove, and command a view of the town, stables, both forts, and in clear weather the Blue Mountains. A private walk will enter the new garden at its northern extremity.' (This gate is still in existence. It connects the middle and lower gardens at the main avenue, and is covered with creeping fig.)

"On 20th August, 1831, Mr. Fraser informed the Colonial Secretary that 'the roads in the Government Domain are now made passable for two carriages.' Then comes the important official announcement, dated September 9, which marks an epoch in regard to the utilisation of the Domain :—

"His Excellency the Governor has directed that it be notified that 'the grounds in the Government Domain, near Anson's Point (Mrs. Macquarie's Chair) have been laid out in walks for the recreation of the public ; and that the Domain will be opened for carriages on Tuesday next, the 13th inst.

"The road from the stairs near Fort Macquarie along Farm Cove to the gate which crosses the road at the extremity of the Botanic Garden is reserved for the exclusive accommodation of persons on foot.

"Carriages and horsemen may enter the Domain at the gate near the School of Industry, or at the Woolloomooloo gate at the southern boundary of the Domain.

"This was the birth of the Domain and its use practically as we know it to-day.

"The same year, 1831, was memorable from the visit of Mr. James Busby to the wine-growing districts of Europe, to select vines likely to be useful in New South Wales. From the Botanic Gardens of Montpellier, France, he obtained no less than 433 sorts, and from the Luxembourg Garden at Paris, 110 sorts. These were transmitted to the colony in the following year, and on January 22, 1833, it was recorded that '362 varieties were alive and for the most part healthy,' in the Botanic Gardens, Sydney. Thus began, in earnest, the wine-growing industry of New South Wales. Busby's vines were planted east of the creek, and in the vicinity of the present hot-houses. For about 25 years they served to propagate vines all over the colony, and this historic vineyard, or rather assemblage of vines, having served its purpose was finally uprooted about 1860. Mr. L. Woolf, then an employé of the Botanic Gardens, and who still retains his interest in horticulture, remembers these vines perfectly, and has given the present writer information concerning them.

"The year 1831 is also memorable, in that Charles Fraser, the first Superintendent of the Botanic Gardens, died on the last day of it. He was undoubtedly a worthy and an able man, and I regret that no portrait of him appears to have been preserved."

"On Fraser's death Allan Cunningham declined the appointment. His brother Richard, then at Kew, was recommended by Robert Brown, and also by Aiton, of Kew, and he was accordingly appointed by the Colonial Office.

"After the special activities of 1831 and absence of a superintendent (Mr. John M'Lean performing duties in the interim), no events of a noteworthy character took place during the year 1832.

"In January, 1833, Richard Cunningham entered on the superintendence of the Botanic Gardens with an earnestness and zeal which furnished good evidence of his having the improvement of the establishment, in its several departments of botany and horticulture, strongly at heart. An experimental ground was

formed in which the cultivation and propagation of vines and fruit trees generally were attended to, and from which the colonists received ample supplies of cuttings. In the botanical division some improvements were made, and many of the rarer indigenous plants were brought in from remote localities that had not previously found a place in the garden; while numerous exotics, adapted to the soils and climates of the colony, were introduced.

"During this year he went to New Zealand in a man-of-war in order to assist in the selection of suitable spars for the use of the Royal Navy. He maintained very friendly relations with the Maoris, and returned to Sydney laden with plants.

"On July 13 he furnished a report to the Governor containing details of his plans of his improvements, which can be more fully understood by reference to a plan by the Surveyor-General (Major Mitchell) executed during the same year.

"During the second half-year we find that 120 of the Busby vines were bearing fruit, and that 1,000 ornamental plants and 1,200 fruit trees, 'exclusive of about 500 olive layers and a vast number, not counted, of grape vines, plants and cuttings . . . seeds of culinary vegetables were distributed in considerable quantities among such persons as applied for them.'

"1834 seems an unevenftul year, the only breeze to cause a ripple being the conduct of a wicked man named Still, whose conduct was not as calm as his name would indicate. He put horses in the 'newly-made plantation leading to the Domain, and entirely destroyed it.' Mr. Still 'said he would send as many horses as he thinks proper to destroy the young trees,' and so the matter was referred to the Colonial Secretary.

"During the year Richard Cunningham zealously attended to the requirements of the garden, and made numerous journeys into the country for the purpose of making himself acquainted with its flora and of collecting seeds and young plants for cultivation.

"We now reach the year 1835. In those days official letters were laboriously copied, copying ink not having been invented. The last letter Richard Cunningham copied in the letter book was dated February 23, and referred to instructions he had received from the Governor to attach himself as botanist to the Surveyor-General's (Major Mitchell's) expedition of exploration to the West.

"What happened soon can best be stated by transcribing a memorial tablet in St. Andrew's Scots Church, Sydney:—

"'Richard Cunningham, Government botanist to the colony, attached to an explorative expedition into the interior, under the command of Major Mitchell, Surveyor-General, wandered in his enthusiasm for botanical investigation, from his companions, and losing himself in the desert country on the Bogan River, fell into the hands of one of the native tribes, by whom he was unfortunately killed about April 25, 1835, in the 42nd year of his age. This tablet is erected as a lasting and affectionate tribute to his memory by Allan, his only brother.'

"The few fragments of his remains were collected by Lieutenant Zouch, of the Mounted Police, and buried at Lower Tabratong, near Dandaloo, where a stone marks his last resting place. The grave is on Hunt Brothers' Burdenda station.

"Thus passed away a martyr to science, one whose usefulness to the colony was only just beginning to fully expand, and one who appears to have been endowed with a singularly agreeable disposition. His scientific reputation has been largely overshadowed by that of Allan, his distinguished brother. It is, of course, impossible to say in what direction Richard, had he been spared, would have made an impression on the Botanic Gardens, and on the botanical investigation of the colony, but we are perfectly justified in saying, from what he accomplished, that his early death (followed as it was so soon by that of his brother) was a blow from which botanical investigation in Australia never recovered till Bidwill's time.

"During 1836 we find that that portion of the Domain between Macquarie Street North and Macquarie Place was alienated primarily with a view to raise funds to build a new Government House, as the Imperial Government was not disposed to incur the necessary expense.

"In this year a committee was appointed to test Busby's vines. James Backhouse, the visiting Quaker philanthropist and botanist, was a member of it, and he writes:—'A large proportion of them are wine grapes, but most of the varieties cultivated for the table in England are among them under their French names.'

"The vacant post of superintendent of the Botanic Gardens was offered to Allan Cunningham. He had refused it some years previously, and was at work at Kew on his Australian plants, when the offer was again made to him on his brother's death.

"Two circumstances combined caused him to accept it. One was that he longed to again investigate the Australian flora on the spot, and the other was that on his long and arduous journeys of exploration his health had so suffered, that he thought a sea-voyage and an exchange to the Australian climate from that of Kew would be beneficial to him. He sailed for Sydney in October, 1836.

"This is not a sketch of Allan Cunningham's life, but of the early history of the Botanic Gardens, and I will content myself therefore with briefly touching upon his connection with the gardens.

"He arrived on February 12, 1837, and in the *Government Gazette* of March 1 his appointment as Colonial Botanist and Superintendent of the Botanic Garden was announced.

"During the interregnum the Governor had appointed a committee of management, and this was unknown to Allan Cunningham when he accepted the post. Its appointment formed one of the reasons why the distinguished botanist and explorer threw up his position. The committee continued to act during the stop-gap administration of overseer Kidd. When Mr. Charles Moore arrived, friction speedily arose, he being a strong man, and

objecting to the interference of the committee in the details of management. A Parliamentary inquiry was held, and the committee, which had met but little of recent years, finally vacated office in 1855.

"Cunningham also made up his mind to resign his appointment in consequence of duties having been imposed upon him which he considered incompatible with his position. He particularly resented having to cultivate vegetables for certain civil and military notables, and the *Sydney Herald* of the time supported him in the stand he took.

"In the early part of December he sent in his resignation to the Governor (Sir Richard Bourke). Colonel Snodgrass, the Lieutenant-Governor, asked him to furnish a report on the state of the garden for the information of the incoming Governor. This he did, and his report is still in existence. He then determined to visit New Zealand on a purely scientific expedition. On January 15, 1838, this gentle spirit wrote to England the only angry letter I ever knew him to pen. He said: 'Tell all, I have discharged the Government cabbage garden in disgust, and am now to enter with all my might, mental and corporeal, on a more legitimate occupation for a few months.'

"By request, and as an act of courtesy to the incoming Governor, Sir George Gipps, he delayed his departure until the arrival of his Excellency on February 23. His Excellency was inclined to take a great interest in the Botanic Garden, and made a great effort to retain Cunningham's services as 'Government Botanist,' a purely scientific appointment, including travel in the colony, leaving the gardening portion of the duties, hitherto attached to the position, to Mr. James Anderson, as superintendent. Cunningham demanded a greatly increased salary on account of the increased cost of living, and his Excellency stated that the proposed salary was not objected to. Still, for some reason or other, the matter was not pressed in the Legislative Council, and on learning this, Cunningham 'finally washed his hands of the garden' in April, 1838.

"In 1837 we have the first record of plants sent from the Botanic Garden, Sydney, to Captain W. Lonsdale, police magistrate, to stock the first Government garden at Melbourne. Almost at the same time plants were sent from Sydney to Captain John Hindmarsh, Governor of the newly-formed province of South Australia.

"During this year Backhouse records that the Norfolk Island pines first produced cones in Sydney. Allan Cunningham, during July, 1837, first formed plantations in Hyde Park. He also did a good deal of tree-planting in the Domain.

"In 1831, as already stated, the enlarged and reorganised garden was first thrown open to the public. In 1838 it was, by the Governor's order, first thrown open to the public on Sundays. Many people now living remember the patriarchal arrangements that took place on that day. The Governor used to attend Divine service at St. James' Church on Sunday mornings, accompanied by his suite and friends. He would then walk over to the existing entrance, near St. Mary's Cathedral, and go across the

Domain to the entrance of the Gardens near the stone fountain. The Garden gates were closed, but an attendant was waiting to open the gates for his Excellency and party, after which the citizens could enter the Garden. I do not know the date on which the Garden was first thrown open on Sunday mornings.

"Allan Cunningham, on his return from New Zealand, returned to his lodgings in Elizabeth Street, thoroughly broken down in health. On June 24, 1839, he was removed from his lodging to his old official cottage in the Botanic Gardens for change of scene and air. Heward says: 'On Thursday, the 27th, his last breath was sighed away in the arms of his faithful friend, James Anderson' (his successor in the superintendence of the Garden). He died of consumption, a martyr to geographical exploration and botanical science, in the 48th year of his age.

"From this passage it is clear that Cunningham died in the Botanic Gardens. The old cottage, sacred through associations with such a man, was demolished less than 30 years ago. Its site was a little north of the Levy Fountain, and a photograph of it, taken in the Fifties, is still in existence.

"Allan Cunningham was buried in the Church of England portion of the Devonshire Street Cemetery, and a marble tablet to his memory was erected in St. Andrew's Scots Church similar in size to that which he had erected in remembrance of his brother Richard.

"In 1844, as the inscription states, an obelisk to Allan's memory was erected on the small island in the course of the creek which flows through the garden to Farm Cove. At this time the tide nearly came up to the obelisk, but filling-in operations now leave the obelisk some distance inland. At the demolition of the Devonshire Street Cemetery the present writer took steps with the view to the removal of Cunningham's remains. These remains (very few) were reverently removed on May 25, 1901, and the actual placing of them in a small leaden casket in a cavity in the obelisk took place in his presence and in that of Mr. George Harwood, the superintendent, and a few friends, on June 26. Thus the obelisk in the Botanic Gardens which has for so many years been a memorial of Allan Cunningham is now also his tombstone. His first tombstone is carefully preserved.

"Allan Cunningham is one of the trio (Robert Brown and Ferdinand Mueller being the others) of botanists and explorers pre-eminent in Australian botanical work, and the permanence of his scientific reputation is beyond the reach of controversy. Allan Cunningham's name will, to the end of time, shed lustre on the Sydney Botanic Gardens. He is the only man whose statue (if he be deemed to require one) can appropriately be placed in that area, sacred with so many botanical associations.

"For some years after Cunningham's death the management of the Garden was not taken sufficiently seriously. The carriage road (part of Mrs. Macquarie's Road) from old Government House to the Chair, passed along the northern boundary of the Garden, thus skirting the present stone wall dividing the middle and lower gardens. This carriage road was fenced with palings, and had the effect of shutting out the view of the harbour, for the

laying out of the lower garden in the early thirties, and to which I have already alluded, was interfered with by reason of its unfenced and unprotected state. It was not many years before Mrs. Macquarie's Road was diverted out of the Botanic Garden into the Domain, and the fencing of the Lower Garden completed, that is to say, the Lower Garden was shut off from the Domain on the one side, and the Government House or inner Domain and Circular Quay on the other. When that was done, the improvement of the Lower Garden advanced by leaps and bounds.

"On April 22, 1842, died James Anderson, who had been Superintendent of the Garden since Allan Cunningham's resignation. He had been the botanical collector of Captain P. P. King's voyage to South America and the Straits of Magellan, &c., and on Captain King's homeward voyage Anderson remained at Sydney. His administration of the Garden appears to have been uneventful; at all events, I know next to nothing of the progress of the Garden during this period. He was buried in the Devonshire Street Cemetery, and on its demolition in 1901 his remains were removed to the Presbyterian section of the new cemetery at La Perouse.

"Governor's Bourke's statue was unveiled on April 11, 1842. The old cottage, the former residence of one of the Domain bailiffs, was pulled down to enlarge the road, the site fixed for the statue being just inside the paling fence opposite to where the cottage formerly stood.

"William Robertson succeeded Anderson, and died in July, 1844. I know nothing of him or his work. He was succeeded by James Kidd, who had been an overseer since July 22, 1833. Mr. Kidd was informed officially that his appointment was only a temporary one. On the appointment of Mr. Bidwill as director, Mr. Kidd reverted to his position of overseer, a post he continued to hold under Mr. Charles Moore till 1866. I do not know the date of his death. His term of office as acting superintendent appears to have been devoid of important incident.

"The unsatisfactory state of the Garden since Allan Cunningham's death had now impressed itself on the Governor and Council, and on September 1, 1847, Mr. John Carne Bidwill was appointed by the Governor, with the title of director (the first time the title was used for this office), and Government Botanist (also a new designation).

"Sir J. D. Hooker speaks of him as possessed of a remarkable love of botany and knowledge of Australian plants. Our records scarcely refer to him, but I have seen a number of letters from him to the late Admiral P. P. King, Sir William Macarthur, and others, showing that he had done yeoman work in hybridising various bulbous plants. He had spent some years in New Zealand, and the well-known Bunya Bunya (*Araucaria Bidwilli*) was discovered by him and bears his name.

"Through some confusion, the Home Government also set about making an appointment to the Botanic Gardens, and Mr. Charles Moore was appointed director by the Secretary of State

for the Colonies, and arrived in Sydney January 14, 1848. Mr. Bidwill had to vacate his appointment on Mr. Moore's arrival, which he did very unwillingly, and with the good wishes of the Governor, who shortly afterwards appointed him Commissioner of Crown Lands for the Wide Bay district of what is now called Queensland. He died March 1, 1853, in his 38th year, after great suffering, caused by exposure in travelling in his district. His Queensland post afforded him many opportunities of making botanical discoveries, and of introducing new plants, of which he very fully availed himself. He was therefore another of the martyrs to science, whom the hardships of early colonial exploration brought to an untimely end, and was at least the fourth officer in charge of the Botanic Gardens who succumbed to zeal for the public service.

"His directorship of the Gardens of little more than three months did not permit him to make his mark on the institution to the extent that he would undoubtedly have done had he continued in office.

"He was, as I have stated, succeeded by the late Mr. Charles Moore, who has but recently passed to his rest. With his directorship commenced the modern era of the Gardens. My predecessor wrote but little, but I have been able to gather together certain data which will enable me, if permitted, at some future time, to lay before my readers some account of the development under his administration of the Sydney Botanic Gardens, an institution of which we are entitled to be proud."

J. H. MAIDEN.

XXXVI.—COLORADO RUBBER.

(*Hymenoxys*, Sp.)

Early in 1904 a correspondent forwarded to Kew an extract from the *Denver Post* of 26th November, 1903, which gave a somewhat enthusiastic account of the discovery by a prospector in Colorado of a rubber-yielding plant. This was spoken of as occurring abundantly in the hills and mesas in the vicinity of Salida, the belt extending into the San Luis Valley, Gunnison County, and as far south as New Mexico. In June, 1905, Mr. E. Naylor, of Bradford, presented to the Museum at Kew a specimen of the dried plant, together with samples of crude and manufactured rubber obtained from it. Mr. Naylor subsequently also communicated seeds of the plant.

Mr. T. D. A. Cockerell, to whom the Museum is also indebted for specimens of the plant and of its rubber, published an account of the species in the *Bulletin of the Colorado Museum* for December, 1903. The plant, which is a member of the natural family *Compositae*, is there identified as *Picradenia floribunda*, *utilis*, which Mr. Cockerell considers to be part of the aggregate *Actinella Richardsoni*. Subsequently, in the *Bulletin of the Torrey Botanical Club* for 1904, p. 461, the same author has

indicated that *Picradenia* may be considered a subgenus of *Hymenoxys*, Cass. If this view be correct the Colorado Rubber plant is therefore a species of *Hymenoxys*.

In July, 1906, Mr. Naylor forwarded to Kew a further supply of material. Accompanying this was the following extract from the letter which Mr. Naylor had received with the specimens :—
 “I have obtained a sample of crude rubber from the experimental plant at Buena Vista; this is, of course, not vulcanised, and if kept in a warm place will become soft and sticky. The round piece is just as it comes from the plant; the flat piece is after its second trip through the machine, and in this form is shipped east to the refinery. The full size of the pieces as shipped is 10 to 15 feet long and 18 inches wide. The root of the native plant yields about 10 per cent. of rubber.”

From the evidence thus obtained there is hardly room for doubt that this species of *Hymenoxys* yields a rubber-like product. This does not, however, compare favourably with many of the lower grades of rubber already on the market. It is therefore somewhat doubtful whether the expectations which have been formed regarding it in some quarters will be realised.

J. M. H.

XXXVII.—IRISH GARDENS.

At the invitation of Mr. Moore, of Glasnevin, and at the desire of the Director of Kew, I spent a fortnight in June in visiting some of the more interesting gardens in Ireland. Mr. Moore was fortunately able to accompany me, and, favoured by their proprietors, we inspected the gardens of the following places :—Castlewellan, Kilmacurragh, Mount Usher, Narrow Water, St. Anns, Fota, Belgrove, Darreen, Rossdohan, Ashbourne, near Queens-town, and several other gardens in the neighbourhood of Dublin.

Our special object was to ascertain what had been done in the direction of establishing reputedly tender trees, shrubs, and perennial plants in the more favoured parts of the island. Both Mr. Moore and myself are fairly well acquainted with the gardens of South Cornwall and South Wales, where the climatic conditions are similar to those of the south and west of Ireland. We were therefore in a position to make comparisons and offer suggestions with regard to what might be tried in Ireland. The things we saw, however, far surpassed our most sanguine expectations. Ireland is favoured with a climate and, in many parts, a soil most suitable to gardening; and fortunately a number of people who are in a position to do so are making good use of their gardens and estates by devoting them to what may be termed experimental horticulture.

During the whole fortnight (the latter half of June) it rained daily, usually in the morning, the afternoons being hot and sunny. The vigour and healthy look of plants of all kinds under these conditions were delightful to behold. It might reasonably be said with regard to Irish gardening that the tools most needed are the

saw, pruning hook, and knife. Generally the plants grow too fast for the gardener, and where plants are set at ordinary distances apart this has its disadvantages. The opinion formed after a fortnight's rapid visit to Ireland in June may not be worth much, but I have no hesitation in saying that of all the countries I have seen Ireland is as well provided by nature with conditions favourable to high-class land cultures—including agriculture, horticulture, and forestry—as the best. In the opinion of competent judges long resident in Ireland, the great need is intelligent labour, but so long as America and other countries hold out tempting inducements in the shape of better conditions of employment to the Irish workers, the best of them will go. If the most were made of the land by employing upon it the best of its people—and there are no better gardeners than Irishmen when they are allowed to use their intelligence—Ireland would soon become the richest instead of, as it is now, the poorest division of the United Kingdom.

GLASNEVIN is to Ireland what Kew is to England. The collection of plants cultivated there is remarkably rich, in some departments the richest I know, whilst their condition is most satisfactory. The zeal of the late and present keepers in collecting, growing, and encouraging others to grow plants of all kinds have no doubt largely contributed to the spread of a taste for gardening in Ireland. This influence is now being turned to account by the Irish Board of Agriculture in the promotion of fruit and vegetable culture, Mr. Moore having the control of a training college where gardeners are taught the best methods of cultivation for the best kinds of fruit and vegetables and then sent to different stations in the country where model gardens are formed under Mr. Moore's superintendence. The men are trained gardeners before they enter the college, and in return for good work they are well paid all the time they are there. In this practical way a knowledge of high-class horticulture is being distributed over the country, and if this is only backed up by capital on the one hand and an intelligent treatment of the workers on the other, the effort cannot fail to have far-reaching results. During the time of my visit to the college a party of Scotch farmers were being shown round by Mr. Houston, the horticultural science instructor, who is also editor of an excellent little monthly journal devoted to Irish gardening. Agriculture is also assisted in the Glasnevin Botanic Garden by the cultivation of plots of agricultural plants of all kinds, including grasses, plants yielding dyes, oils, fibres, tobacco, &c. Each plot bears a label showing name and time of sowing. There is also a garden of herbs and other economic plants.

Before leaving Glasnevin, note must be made of the "lions" of the collection, such as *Nepenthes Rajah*, a grand plant over 20 years old; *Gleichenias*, the largest specimens I have ever seen; *Eulophiella peetersiana*, a giant with leaves 4 feet long and 6 inches across; the fine specimens of palms and cycads; the extensive and well-grown collection of orchids; the superb water-gardening, where *Nymphaeas* are magnificent; alpine plants and hardy ferns, all in splendid health. Certainly the national botanic garden of Ireland is one of its most valuable assets.

CASTLEWELLAN. The Earl of Annesley has made his garden famous throughout Europe. It is the best proof that Ireland is a great gardeners' country that in the lifetime of one man a hillside should have been turned into a grand "gallery" of trees and shrubs in which giant specimens of many kinds of *Coniferae*, looking at least a century old, of many kinds of New Zealand, Chilian, Californian, Himalayan, and South European trees and shrubs in the rudest health, all testify to the genial character of the climate, the richness of the soil, and the sagacity of the proprietor. A full account of this garden, with photo-illustrations of some of the specimen plants, was recently published by the Earl of Annesley. As an indication of what may be found there I may mention the following:—*Picea morindoides*, a grand specimen tree, unique in Europe; *Fagus cliffortiana*; *Cornus florida*, a big bush in flower; *Fejoia sellowiana*, happy as a privet; *Restio subverticellatus*, three years outside and looking quite happy; *Acer Hookeri*; *Cordyline indivisa*, true, a grand plant with leaves 6 inches across; *Lomatia ferruginea*, a beautiful Protead well set with flower buds and since figured for the *Botanical Magazine*. There was the usual display of *Olearias*, *Tricuspidarias*, *Azalea indica*, Himalayan *Rhododendrons*, &c.

KILMACURRAGH. The garden of Mr. Thomas Acton is the most interesting in Ireland. Here there is little evidence of keep, but there has been much judgment in the planting, and generally things look happy. The soil appears to be deep and rich, and there is plenty of water. The great feature at the time of our visit was a tree of *Embothrium coccineum* in full bloom—it was 35 feet high with a spread of 30 feet, the trunk 15 inches through, and covered with flowers: this was planted as a baby about 30 years ago by Mr. Acton. *Desfontainea spinosa*, 12 feet through; *Drimys Winteri*, 30 feet high, in full bloom; *Magnolia Campbelli*, 25 feet high; *Tricuspidaria lanceolata* (*Crinodendron hookerianum*), 18 feet high, 10 feet through, the branches weighed down by the flowers—I never saw such a plant; *Swammerdamia Antennaria*, 10 feet high, 15 feet through, covered with flowers; and the Himalayan *Rhododendrons*—many finer than the finest in Cornwall—*R. Keysii* (9 feet), *R. Delavayi* (8 feet), *R. decorum* (10 feet), *R. lacteum* (6 feet), *R. Roylei* (12 feet), *R. argenteum* (18 feet), and many others—not thin bushes, but fat, mostly wider than high, and in grand health. It was worth the journey to Ireland to see *R. Falconeri* there—such a bush—18 feet high and 21 feet through, with six main branches each over 6 inches in diameter; it bore the remains of hundreds of flower-heads, and was in the midst of making new growth. I noted also the following (the figures in each case indicate height and spread of branches):—*Podocarpus chilina*, 22 feet; *Saxegothea conspicua*, 15 feet by 12 feet; *Athrotaxis selaginoides*, 34 feet; *A. laxifolia*, 20 feet; *A. imbricata*, 15 feet; *Cupressus lusitanica*, with a trunk 3 feet in diameter and a wide-spreading oak-like head; *Prumnopitys elegans*, 25 feet; *Podocarpus nubigenus*, 20 feet; *Libocedrus tetragona*, 12 feet; *Pinus aristata*, 12 feet; *Fagus Moorei*, 14 feet; *F. Cunninghamii*, with a trunk 15 inches through, 40 feet high; *Olea intermedia*, a large tree; *Cunninghamia sinensis*, 25 feet; *Laurelia aromatica*, planted 30 years ago, now 40 feet high and growing with great vigour; *Ilex latifolia*,

12 feet; *Myrtus Luma*, 15 feet by 15 feet; *Fuchsia excorticata*, 15 feet; *Senecio Greyi*, 4 feet by 10 feet, a magnificent mass of yellow flowers. *Ceratonia Siliqua*, a big bush, has stood out for 30 years. The commoner trees are well represented. I noted *Cupressus lawsoniana*, 80 feet high; *Abies Pindrow*, 50 feet; and there is a grand avenue of silver firs leading up to the house. Mr. Acton, now an octogenarian, has been his own gardener all his life.

The only nursery we visited was that of Mr. T. Smith in the town of Newry. This is one of the most interesting gardens in Ireland. The collection is quite botanical in comprehensiveness; I doubt if there is another commercial collection of hardy plants like it anywhere. Not only for Ireland, but for England, the continent, and even America this nursery is the "shop" for the choice and rare among hardy plants. The proprietor, an Englishman, trained in the Chelsea nursery of Messrs J. Veitch and Sons, is a keen collector and cultivator, and his knowledge of plants is quite exceptional. I found many plants there that were not in the Kew collection. The prominent features at the time of our visit were the Verbascums, large beds of them in full flower; *Anchusa italica grandiflora*, *Saxifraga pyramidalis*, *Incarvillea Delavayi* by the thousand, the racemes 2 feet high and the flowers enormous; Primulas, Dianthus, Delphiniums, Helianthemums, and Roses. We spent the greater part of a day in the nursery before proceeding with Mr. Smith to Narrow Water, where there is a fine garden and collection of plants formed by the proprietor, Captain Hall.

MOUNT USHER is the delightful garden retreat of the brothers Walpole of Dublin. Formerly a mill-house on a stream in a sheltered nook it has been transformed into a garden paradise. I have never seen a more lovely garden. Water plants, ferns, herbaceous and alpine plants and flowering trees and shrubs are grown in the greatest luxury and profusion. One part of the garden is almost a wood of *Cordyline australis*, the under growth being formed of such plants as *Mitraria*, *Tricuspidaria*, *Romneya*, *Desfontainea*, *Solanum crispum*, *Salvias*, *Calceolaria violacea*, *Habrothamnus*, *Lavatera assurgentiflora*, etc. *Eremurus robusta* was 9 feet high, *Abutilon vitifolium* 20 feet, and a colony of *Meconopsis Wallichii* as happy as sow thistles. The water plants were most effective—great masses of *Saxifraga peltata*, *Primula sikkimensis*, Rodgersias, Gunneras, Nymphaeas, *Mimulus*, *Ourisia coccinea*, *Orchis foliosa*, Japanese Iris, *Myosotidium nobile*, *Parechites communis*, Gentians, *Senecio macrophylla* and many others were very happily provided for. The stream sides were richly clothed with ferns and other suitable plants.

DARREEN. This is the Irish home of the Marquis of Lansdowne, who adds to his great political reputation that of being a keen amateur gardener and an excellent landlord. His garden of some 30 acres is on the south side of Galway Bay, and here, as in other gardens that we saw, the conditions favour the cultivation in the open air of what are known as sub-tropical plants. The most striking features of the garden are magnificent

masses of Indian Bamboos and gigantic coniferous trees. I have never seen *Abies nordmanniana* so perfect and luxuriant as at Darreen. *Gaultheria Shallon* was 8 feet high, *Griselinia littoralis* planted in 1882 was 30 feet high, *Veronica Traversii* 15 feet, *Acacia dealbata* 50 feet, *Eucalyptus Globulus* 80 feet, *Azara microphylla* 25 feet, *Olearia Forsteri* 20 feet by 20 feet, *Euphorbia mellifera* 10 feet through, *Erica arborea* 10 feet, *Myrtus Luma* 20 feet, *Ilex crenata* 15 feet by 15 feet, *Leptospermum lanigerum* 15 feet; enormous plants of *Cordyline*, one measured had a stem 3 feet in circumference; Kalmias like Portugal laurels; *Leptospermums* like Privets; Metake bamboo 12 feet high, and Falconer's bamboo 25 feet high, 40 feet spread, with 1,000 canes, all in flower, a marvellous sight.

ROSSDOHAN. This is also on Galway Bay and is the property of Dr. Heard. It is practically an island and some twenty years ago was almost waste land with scarcely a tree upon it. By planting first shelter trees and then many kinds of Australian, New Zealand, Himalayan, and Californian trees and shrubs it has been turned into a jungle of exotic vegetation. Simon's bamboo 15 yards across, *Aralia Maximowiczii* 20 feet high, *Acacia decurrens* 30 feet, *A. melanoxylon* 20 feet, *A. falcata* 30 feet, *Eucalyptus urnigera* 40 feet, *Olea europaea* 15 feet, *Melaleuca hypericifolia* 10 feet, *Cassinia longifolia* 15 feet, *Hakea saligna* with a 12 inch stem, *Agonis marginata*, great shrubs; *Brugmansia sanguinea*, Pittosporums, Escallonias, Kunzeas, Ozothamnus, Callistemons, Boronias, Camellias, *Daphne indica* and *Asparagus plumosus*. These are a few of the plants noted as being successes in Dr. Heard's garden. It is clear that, with shelter from the strong sea winds, a very large number of plants from sub-tropical regions may be grown on the south-west side of Ireland. We were unable to get to the garden of Lord Dunraven, also in Galway Bay, but we were informed that it is of similar character to those of Lord Lansdowne and Dr. Heard.

FOTA. This, the seat of Lord Barrymore, is famous for its garden, the noblest in Ireland and one of the most delightful in the world. I saw it fifteen years ago and was astonished by the change that had taken place in so short a time. Truly, plants grow rampantly in Ireland. Fota is a place of trees, especially conifers. An evergreen oak with a trunk nearly 7 feet through, a cork-barked tulip-tree and groves of *Cordyline* and *Yucca gloriosa* near the entrance give the note for the whole place. All Falconer's bamboos have flowered and there are hundreds here, the children of those which flowered at Fota thirty years ago. A list of the big trees in this garden would be longer than space will permit. The special things that may be mentioned are *Fagus Cunninghamhamii*, 50 feet; *Embothrium coccineum*, 30 feet by 30 feet; *Benthamia fragifera*, 40 feet by 50 feet; *Berberis nepalensis*, 12 feet by 20 feet; *Pittosporum Mayi*, 40 feet; *Ilex latifolia*, 40 feet; *Genista racemosa*, 12 feet; *Eriobotrya japonica*, a grand old tree; *Acacia dealbata*, a tree; *Clanthus puniceus*, 30 feet through; *Dusylirion longifolium*; *Asparagus retrofractus*, a great mass against a wall; *Phoenix senegalensis*, two big specimens outside for twelve years. The great trees of *Pinus Ayacahuite*, *P. insignis*, *P. Montezumae*, *Picea Morinda*, *P. alcockiana*, *Abies grandis*, *A. numidica*, *A. bracteata*, *A. religiosa*, *A. webbiana*,

A. cephalonica, *Tsuga brunoniana*, and *Cryptomerias* are grand to see, and the groves of bamboos, *Phormiums*, *Cordylines*, *Chamaerops*, *Aralias*, etc., are noble. Water gardening is a special feature, and in swampy situations there are many kinds of flowering and foliage plants that love moisture.

BELGROVE. A few miles from Fota is Mr. Gumbleton's garden, the home of many rare and interesting plants, the proprietor being a very keen collector and tester of plants of all kinds. Mr. Gumbleton knows more about garden plants than any amateur that I have ever met, and his knowledge has full play in his own garden. We were unfortunate in having to see the garden on a pouring wet day. Some of the plants noted were *Anemone Fanninii*, a mass 6 feet through, the peltate leaves 2 feet high and 15 inches across, and the scape 6 feet: I had never seen this plant so good, although Kew introduced it about 15 years ago. *Olearia insignis* against a wall bore 9 flowers. *Freylinia cestroides*, 10 feet; *Daphniphyllum glaucescens*, 18 feet by 18 feet; *Pterostyrax hispida*, a tree draped with its lovely white flowers; *Plagianthus Lyallii*, *Xanthoceras sorbifolia*, *Buddleia Colvillei*, *Eucryphia pinnatifolia*, *E. cordata*, *Romneya Coulteri*, *Escallonia langleyensis*, *Veronica Hectori*, and *V. Lindsayi* were seen in fine condition. Mr. Gumbleton also makes a speciality of Begonias, Pelargoniums, Disas, and of course, herbaceous plants.

ST. ANNS. The stately home of Lord Ardilaun is more like an English nobleman's residence than any that I saw in Ireland; and this is true of the garden also. The keep of the place is good, the collections of plants are comprehensive and well cared for, and there is an air of cultivation wherever one looks. Lady Ardilaun is a keen gardener and loves to experiment with plants of doubtful hardiness, providing shelter fences and hurdles for those supposed to need it until they are well established. *Buddleia Colvillei*, a bush 12 feet high, was in flower; also big bushes of *Cassia corymbosa*, *Carpenteria californica*, and *Pentstemon coccineum*. Roses and carnations are splendidly grown there.

ASHBOURNE. Mr. Beamish has formed here a delightful garden which in a few years will most likely be much talked about. It is partly on a steep slope with the bare rocks showing here and there, a situation that lends itself to rock gardening, and Mr. Beamish has made the most of it. The whole garden is well conceived and the construction of the rockery most picturesque. Plants grow exceptionally well there, and as the proprietor spares neither money nor pains to secure the best, his garden is sure to prosper.

W. W.

XXXVIII.—MISCELLANEOUS NOTES.

Mr. HARRY DODD, a member of the gardening staff of the Royal Botanic Gardens, has been appointed by the Secretary of State for the Colonies, on the recommendation of Kew, Curator of the Botanic Station at Onitsha, Southern Nigeria.

Mr. WILLIAM HEAD, a member of the gardening staff of the Royal Botanic Gardens, has been appointed by the Secretary of State for India in Council, on the recommendation of Kew, a probationer gardener for service in India.

Mr. RUPERT BADGERY, a member of the gardening staff of the Royal Botanic Gardens, has been appointed by the Secretary of State for India in Council, on the recommendation of Kew, a probationer gardener for service in India.

J. M. CROMBIE.—The Rev. James Morrison Crombie, F.L.S., was born at Aberdeen in 1831,* and was educated at Marischal College there, and at Edinburgh University, where he took his M.A., and was subsequently appointed a minister in the Established Church of Scotland. He was early attracted to natural history, and his first production was a small volume on Braemar in 1861. Five years later he came to London and held various appointments till failing health in 1903 compelled him to give up his latest post as Clerk to the Synod in England. He died at Ewhurst, Surrey, on 12th May, 1906.

He was lecturer on Botany at St. Mary's Hospital from 1879 to 1886, but the work by which he is best known, was his work on Lichens; he determined the collections brought home by numerous travellers, and described them as parts of these series or as detached papers in journals; he also drew up accounts of the Lichens in the herbaria of Dillenius and of Withering. He issued a brief account of British Lichens in 1870, and designed a fuller monograph with descriptions of the species in the British Museum, of which he only completed the first volume. He was thoroughly in accordance with his old friend Nylander in rejecting the symbiotic theory of Lichens, and this strong prepossession coloured much of his writings. The Herbarium at Kew was indebted to him for the determination from time to time of Lichens belonging to the collection.

B. D. J.

* The late Mr. Crombie has been stated by his widow to have been born on 20th April, 1830, by himself to have been born in 1833. The latter date is certainly incorrect, the former is probably so. Professor Trail, who has kindly made the necessary enquiries, finds that there is no entry in the Parish Register of Mr. Crombie's birth; the entry refers to his baptism, and is as follows:—"Baptisms in Old Machar in 1831, April 20, 1831, John Crombie, ship captain, Huntly Street, and his spouse, Ann Morrison, had a son born named James Morrison, baptised by the Rev. Joseph Thorburn; witnesses, James and William Morrison." Mr. Crombie attended the Arts Classes, Marischal College, Aberdeen, during the sessions 1847-48 and 1848-49.

WILLIAM JAMES FARRER.—Sincere regret will be expressed not only by those to whom he was personally known, but also by all interested in the important problems connected with the improvement of wheat, on learning of the sudden death, resulting from heart disease, of Mr. William James Farrer, of Lambrigg, N.S.W.

Farrer was born near Kendal in Westmorland in 1845, and was educated at Christ's Hospital (Bluecoat School). He afterwards entered Pembroke College, Cambridge, where he graduated in 1868, being placed among the Wranglers in the Mathematical Tripos.

On account of ill-health he sailed for Australia about 1870, and was employed as a surveyor under the Lands Department of New South Wales.

In 1886 he resigned his connection with the Survey Office and devoted himself to the systematic improvement of wheat by cross-breeding and selection, always keeping in view two primary objects—resistance to drought and to rust, maintaining at the same time a high milling standard. The success achieved in this direction is now common knowledge, and it is highly probable that in the near future wheat will be profitably grown over immense tracts in Australia, which up to the present have been considered unsuited to it on account of drought or the prevalence of rust. His work has also been appreciated outside Australia. A few years ago Mr. Morland, Director of Agriculture in the United Provinces of Agra and Oudh, India, paid a visit to Australia to study the methods adopted by Farrer, with the object of instituting similar lines of research in India. Farrer's work was also much appreciated in the United States.

In 1898 Farrer was engaged as Wheat Experimentalist by the Minister of Mines and Agriculture, a post which he filled to the time of his death.

G. M.

Visits to Ireland and Scotland.—The Curator of the Garden, Mr. Watson, paid a visit to Ireland, which extended from June 18 to July 1, 1906, for the purpose of seeing some of the more notable gardens in that country. Mr. Watson's report on this visit, which proved to be very interesting and profitable, is published in the current number of the *Bulletin*.

The Assistant Curator of the Garden, Mr. Bean, visited Scotland with a similar object between July 9 and July 27, 1906. This visit was attended with equally satisfactory results. Mr. Bean's report will appear in a subsequent *Bulletin*.

***Elliottia racemosa*, Muhl.**—A peculiar, and to botanists a regretful, interest attaches to those plants that have become or are becoming extinct in a wild state. *Elliottia racemosa* is one of these. It was first discovered early in the last century by Stephen Elliott—in honour of whom the genus is named—on the banks of the Savannah River in Georgia. It was afterwards found again twice on the banks of the same river. But the only site on which

for many years it is known to have occurred is now under cultivation, and *Elliottia racemosa* probably exists in a few places as a cultivated plant only. Through the kindness of Mr. P. G. Berckmans, a nurseryman of Augusta, Georgia, who at one time possessed (as he expressed it) "the sole visible representatives" of the species, Kew has in cultivation now two small, but healthy, specimens. Mr. Berckmans first sent plants to Kew in 1894, and in a letter dated February 27, 1894, says: "I take pleasure in sending you a few plants of *Elliottia racemosa*, which are the first I have ever been able to propagate since I collected a few plants 30 years ago in company with the late Dr. Asa Gray. Our attention was called to some shrubs which were growing in a high sandy pine section about 15 miles from Augusta and producing very showy flowers. Very much to our delight we found these to be the exceedingly rare *Elliottia*." These plants, sent in 1894, however, did not take root, and ultimately died. In 1902 two more plants were sent, and these, fortunately, are now well established in the open ground. The species is evidently one not easy to propagate. Several methods were tried by Mr. Berckmans, but even a moderate success was only attained by means of root-cuttings. It is likely, therefore, to long remain a plant of exceeding rarity. Kew possesses probably the only plants in Europe.

Elliottia is a genus belonging to the *Ericaceae*, of which *E. racemosa* is now considered to be the sole representative. Two Japanese shrubs, viz., *Tripetaleia bracteata*, Maxim., and *T. paniculata*, Sieb. & Zucc., were, by Bentham and Hooker, placed under *Elliottia*, but the genus *Tripetaleia* has latterly been restored by Drude. Neither of these Japanese species possesses the attractive qualities of the true *Elliottia* of Georgia, which grows to as much as 10 feet in height, and has alternate deciduous leaves $1\frac{1}{2}$ to 5 inches long, dark green above, paler and slightly hirsute beneath. Its flowers are borne in terminal racemes 6 to 10 inches long, each flower being about 1 inch in diameter, the corolla consisting of four white narrow-oblong petals. The fruit is unknown. The only published figure of the species is in "Garden and Forest," 1894, p. 205.

Presentations to Museums.—DRIFT FRUITS.—An interesting series of Drift Fruits and Seeds collected by Dr. H. B. Guppy during 1904 in the Guayaquil River and on the coast of Ecuador and the Pacific and Atlantic sides of the Panama Isthmus has been mounted and placed in the special case reserved for drift material opposite Case 85, Museum No. I.

ST. LOUIS EXHIBITION.—A Bronze Medal and a Diploma awarded to the Board of Agriculture and Fisheries for its exhibit at the St. Louis Exhibition, 1904, have recently been received at the Museum.

Part of the exhibit consisted of a plan and a series of photographic views of the Royal Botanic Gardens, Kew, a duplicate set

of which will be found in Museum No. III., together with the Diploma. The Medal has been placed in the case reserved for similar objects on the top floor of Museum No. I.

It may be mentioned here that copies of these views exhibited by H.M. Office of Works gained a similar distinction at the Paris Exhibition of 1900. The Medal and Diploma then obtained will be found side by side with those awarded at St. Louis.

The official description of the St. Louis Medal is as follows :—

In the composition of the obverse of the medal are shown two figures, one of which, Columbia, tall and stately, is about to envelop the youthful maiden by her side, typifying the Louisiana Territory, in the flag of the stars and stripes, thus receiving her into the sisterhood of States. The other figure is depicted in the act of divesting herself of the cloak of France, symbolized in the emblem of Napoleon, the busy bee, embroidered thereon. In the background is shown the rising sun, the dawn of a new era of progress to the nation.

The reverse of the medal shows an architectural tablet bearing an inscription giving the grade of the medal. Below the tablet are two dolphins symbolizing our eastern and western boundaries, the whole surmounted by an American Eagle, spreading his wings from Ocean to Ocean.

On the Gold Medal there are three distinct corners, each containing a wreath encircling a monogram or emblem, and each of these wreaths is surrounded by 14 stars, representing the Louisiana Purchase States and Territories. On the Grand Prize design there is the same number of stars in the upper field of the shield, and there are 13 bars in the lower field, representing the original States. On the design of the Silver Medal the artist has used the cross of the Order of Saint Louis.

The medal was designed by Adolph A. Weinman. The design was approved by a committee composed of J. Q. A. Ward, Daniel C. French, and Augustus St. Gaudens.

The dies were engraved and the medals struck by the United States Government Mint at Philadelphia. The alloy for the medals was made especially for the Exposition after samples were submitted and passed upon by expert medallists.

FORESTRY EXHIBITS.—His Grace the Duke of Wellington, K.G., G.C.V.O., Strathfieldsaye House, Mortimer, has presented to the Museum a fine series of Photographs illustrative of Forestry in this country.

The Most Hon. the Marquis of Lansdowne, K.G., G.C.S.I., Bowood, Calne, Wilts, has presented to the Museum planks of the following home-grown timbers :—

Liriodendron tulipifera,
Quercus Cerris,
Sequoia gigantea.

G. F. Luttrell, Esq., Dunster Castle, Dunster, Somerset, has presented to the Museum a longitudinal section of "Brown Oak."

JAMAICA TEA.—Several samples of Tea grown and prepared at Claremont, Jamaica, have been presented to the Museum by Mr. H. E. Cox at the request of Sir Daniel Morris, K.C.M.G., Commissioner of the Imperial Department of Agriculture, West Indies. The samples will be found in case 10, Museum No. I., together with Tea grown and prepared at the Cinchona Plantations, Jamaica, from Assam plants received in the Island in 1868. This latter specimen was forwarded to Kew by Mr. R. Thompson in 1874. Another sample from this island was obtained from the Jamaica Court, Colonial and Indian Exhibition, 1886.

OIL SEEDS.—Seeds of *Telfairia occidentalis*, Hook. f., which is described as a lofty climber of the order *Cucurbitaceae*, have recently been received from a Liverpool firm as an oil-seed from the Gold Coast, for determination. Samples of these seeds have frequently been submitted for identification; so far as was previously known, they are only used as a food, for which purpose the plant is commonly cultivated by negroes in Tropical Africa, the seeds being boiled before eaten.

Specimens of the fruit, which is about two feet long and is acutely ribbed, together with examples of the large orbicular seeds from Lagos and the Gold Coast, and germinating seeds from the Royal Gardens, are exhibited in case 57, Museum No. I.

Additions to the Herbarium during 1904.—Donations of specimens were made by about ninety persons and institutions, and amounted to over 8,000 sheets. The specimens purchased amounted to over 4,000 sheets. The principal collections are enumerated below.

VARIOUS PARTS OF THE WORLD. *Presented*:—Mosses, by Dr. V. F. Brotherus; type-specimens of his species of *Inocybe*, by Prof. C. H. Peck.

Purchased:—Heller, Fungi of Puerto Rico and Hawaii; Kneucker, "Gramineae Exsiccatae," lief. xv.-xvi.

EUROPE. *Presented*:—"Hieraciotheca gallica et hispanica," fasc. xiii.-xiv., by M. G. Gautier.

Purchased:—Dahlstedt, Scandinavian Hieracia, Cent. xvi.; W. H. Pearson, British Hepaticae; Woloszczak, "Flora polonica exsiccata," Cent. x. and xi., *part*.

ORIENT. *Presented*:—Cyprus, by Miss E. A. Samson.

EASTERN and CENTRAL ASIA. *Presented*:—Orchidaceae and Ranunculaceae, by the Natural History Museum, Paris; Japan, by Mr. H. J. Elwes; China, principally Hong Kong, by Mr. W. J. Tutchet.

Purchased:—Takeda, Japan, Cent. i.-ii.

INDIA. *Presented*:—By the Botanic Gardens, Calcutta; by Sir D. Brandis, K.C.I.E.; by Lieut.-Col. A. A. Barrett; Himalayan Mosses, by Mr. J. F. Duthie.

MALAYA. *Presented*:—Philippine Islands, by the Bureau of Government Laboratories, Manila; Northern Siam, by Mr. C. B. Clarke; Siamese trees, by Mr. D. O. Witt.

AUSTRALASIA. *Presented*:—Beckett, New Zealand Mosses, by Mr. J. F. Duthie; Chatham Islands, by Mr. F. A. W. Cox; Norfolk Island and New South Wales, by Mr. J. H. Maiden.

TROPICAL AFRICA. *Presented*:—Whyte and Sim, Liberia, by Sir H. H. Johnston, G.C.M.G., K.C.B.; Pobèguin, Grasses of French Guinea, by the Natural History Museum, Paris; W. R. Elliott, Nigeria, by the Imperial Institute; Klaine, Gaboon, by the late M. L. Pierre; Hereroland, by Prof. H. H. W. Pearson; Sudan, by Mr. A. F. Broun; Somaliland, by Major D. Thomson; Uganda, by Mr. M. T. Dawe; Allen, Victoria Falls, by Sir C. Metcalfe, Bart.; do., by Mr. C. E. F. Allen; Thymelaeaceae, by Botanic Garden, Berlin.

SOUTH AFRICA. *Presented*:—By Dr. H. Bolus; by Prof. P. MacOwan; Schlechter, South and South-West Africa, by Dr. H. Schinz; Transvaal, by Mr. J. Burt Davy; Bonomi, Tristan d'Acunha, by Prof. P. MacOwan; Cape Ericaceae, by Mr. E. E. Galpin; Asclepiadaceae, by Dr. S. Schönland.

Purchased:—Junod, Transvaal.

NORTH AMERICA. *Presented*:—Greenland, by Mr. C. H. Ostenfeld; Langworthy, Vancouver Island Mosses, by Mr. W. Bellerby; Central New York, by Dr. J. V. Haberer; Williams, Fungi of the United States, by the U.S. National Museum; Orchids, by Mr. Oakes Ames; Crataegus, by the Arnold Arboretum.

Purchased:—Heller, California; Hall, California; C. F. Baker, West Coast, North America; Metcalfe, New Mexico; Eggleston, North-Eastern United States.

CENTRAL AMERICA. *Presented*:—Gaumer, Yucatan, fasc. ii., by the Field Columbian Museum, Chicago.

Purchased:—C. F. Baker, Nicaragua.

WEST INDIES. *Presented*:—By the New York Botanic Garden.

Purchased:—Curtiss, Isle of Pines; Nichols, Jamaica.

TROPICAL SOUTH AMERICA. *Presented*:—Seed-drift from the rivers and coasts of Ecuador and Panama, by Mr. H. B. Guppy; Weir, Mosses, by Mrs. S. Weir.

Purchased:—Ule, Amazons; Fiebrig, Paraguay; Reineck, South Brazil.

TEMPERATE SOUTH AMERICA. *Presented*:—Cryptogams from Gough and South Orkney Islands, by Mr. R. N. R. Brown; Argentine Republic, by Mr. T. Stuckert.

The largest collection received was from the Philippine Islands, and consisted of about 1,600 specimens presented by the Bureau

of Government Laboratories, Manila, to which Institution nine volumes of Hooker's *Icones Plantarum*, Ser. III., were sent in exchange.

An interesting series of collections by Messrs. A. Whyte and D. Sim in the Republic of Liberia was communicated by Sir H. H. Johnston, G.C.M.G., K.C.B., on behalf of the Monrovia Rubber Company. The collections were made in the following localities:—(1) Within a radius of six miles round Monrovia; (2) in the hinterland of Monrovia, within a radius of 20 miles from Kaka Town; (3) in the basin of the Sinoe River. They comprised over 260 species, of which 67 were found to be new. Sim's collections consisted chiefly of Apocynaceae, and the novelties have been described in the *Addenda to Dyer, Fl. Trop. Afr.*, vol. iv., sect. 1. Among the plants collected by Whyte were 4 new genera and 58 new species, which have been described in a paper by Dr. O. Stapf, entitled "Contributions to the Flora of Liberia" (*Journ. Linn. Soc. Bot.*, vol. xxxvii., pp. 79-115).

The first instalment, numbering 500 sheets, of an interesting collection from the Amazons region was acquired by purchase from Dr. E. Ule. Besides exploring the Jurua and other Brazilian tributaries of the Amazons, Dr. Ule traversed much of the ground formerly botanized over by Spruce, and his collections, besides supplementing those formed by the latter, actually contain new species from such places as Tarapoto, where Spruce collected a very extensive series of specimens.

Other valuable accessions were:—A series of over 500 Indian plants, including 160 Acanthaceae from the Malay Peninsula, presented by the Botanic Gardens, Calcutta; about 500 Uganda plants, collected by Messrs. M. T. Dawe and E. Brown, and presented by the former; about 450 West Indian plants presented by the New York Botanical Garden; 300 plants from the Isle of Pines, near Cuba, purchased from the collector, Mr. A. H. Curtiss; and 200 sheets of Klaine's Gaboon specimens, presented by the late M. L. Pierre, who published descriptions and discussed the affinities of many of the novelties in the *Bulletin Mensuel de la Societe Linnéenne de Paris*.

Cotoneaster microphylla, Wall., naturalised in England.—Mr. S. T. Dunn (*Alien Flora of Britain*, p. 71) records *Cotoneaster microphylla*, Wall., as "said to be naturalised on Brean Down, in Somerset." The specimen on which this statement is based is at Kew, and was received in 1892 from Mr. Arthur Smith, with the information that it "is established on Brean Down, Somerset." Within the last few weeks two other specimens, collected under conditions suggesting actual naturalisation, have reached Kew. One came from the chalk downs, near Ventnor, in the Isle of Wight, and was communicated by Mr. F. R. Armitage. The other was found by Mr. A. D. Annesley, of Amberley, Stroud, Gloucestershire, on Radborough Common, near Stroud, several hundred yards away from any house. *C. microphylla* is a native of the Himalayas from Kashmir to Bhotan, and ranging from

4,000–8,000 feet, and in a varietal form (var. *glacialis*) even up to 14,000 feet. It was first grown in England about 1825 from seeds sent by Dr. Wallich, and has ever since been in cultivation in this country, usually for covering walls. It is not often the case that woody plants become naturalised, and authentic cases are therefore worth being put on record.

Rhododendron aucubifolium.—When working out the genus *Rhododendron* for the enumeration of Chinese plants in the Journal of the Linnean Society, I described a *R. aucubifolium* (vol. xxvi., p. 19), and on the authority of Dr. A. Henry, stated that it was very rare, only one bush having been observed. The specimens were mounted, and the flowers detached from the branches when they came into my hands; but there was no apparent reason for doubting the relationship of the leaves and flowers. However, Mr. E. H. Wilson, who visited the locality in which it was supposed to grow, failed to find a *Rhododendron* agreeing in foliage with my *R. aucubifolium*. Recently comparing his very long series of specimens of *Rhododendron*, Wilson was struck by the strong likeness of the flowers of *R. aucubifolium* to those of *R. pittosporifolium*, Hemsl., and on placing them side by side they proved to be the same. Then a close examination of the leafy branches brought to light the fact that inflorescences of *R. pittosporifolium* had been inserted in the tips of the somewhat thick branches of *Daphniphyllum macropodum*. The basal part of the inflorescence of the *Rhododendron* is still present in each specimen in the branch of *Daphniphyllum*, and so deftly were the inflorescences inserted that it is necessary to look very close to see the deception.

This is not the only instance of this kind of perverted ingenuity practised by one of Dr. A. Henry's Chinese coolies, named Li Ten Yao. These artificial combinations were not detected by Dr. A. Henry, because he had not time to examine a tithe of the plants brought in by his collectors. However, Li was a good collector, though a little unscrupulous as to the nature of some of his novelties, and Mr. Wilson engaged him as an assistant, knowing of his wicked ways. One day Li, who by the way was a convert to Christianity, came with "a very rare and curious plant," which he had had the good luck to discover. He was permitted to go into particulars, and then his fraud was exposed before his comrades, and he had to suffer the loss of a fortnight's pay. In this instance he had associated *Rhus semialata* and a species of *Viburnum*, and, so far as we know, this was his last creation.

W. B. H.

Presentations to the Library during 1903.—The following works, many of which are of considerable value, were presented by the Bentham Trustees: *Angelita, I pomi d'oro*, 1607; Conder, *Land-scape Gardening in Japan*, and *Supplement*, 1893; *Gallesio*,

Pomona italiana, 1817–39, a magnificent work in 6 folio volumes, and *Gli agrumi dei giardini botanico-agrarii di Firenze*, 1839, by the same author; *Jordan & Fourreau, Icones ad floram Europae*, 1903, the completion of vol. ii. (74 plates), and the whole of vol. iii.; *Lonitzer, Botanicon: plantarum historiae, cum earundem ad vivum arteficiose expressis iconibus, tomi duo*, 1565; *Markham, The English Husbandman*, 1635; *Mascall, A booke of the arte and maner howe to plant and graffe all sortes of Trees, etc.*, 1572; *Ortus Sanitatis*, in German, printed by Schönsperger at Augsburg in 1496; *Venuti, De agricultura opusculum*, 1541; *The English Flower Garden; a monthly magazine* . . . by *W. Thompson*, 1852–53, 2 vols., and all published of a third; *L'Horticulteur universel* . . . rédigé par *C. Lemaire*, etc., 1839–46, 7 vols. The continuation of about 20 serial publications have also been presented by the Bentham Trustees. Further publications of the Musée du Congo, including *Études de systématique et de géographie botaniques sur la flore du Bas- et du Moyen-Congo, par E. De Wildeman*, i., fasc. 1, have been received from the Secrétaire Général du Département de l'Intérieur, Brussels, and several works by Dr. De Wildeman, chiefly on the flora of the Congo, from the author. *Donn, Hortus cantabrigiensis*, ed. 8, 1815; *Haworth, Synopsis plantarum succulentarum*, 1812, 2 copies; and 37 photographs, chiefly of species of *Agave* in the collection of Baron de Jonge van Ellemeet, were presented by Mr. T. H. Kellock. *Fraser, Notes on the Natural History, etc., of Western Australia*, 1903, received from Dr. A. Morrison; *Geare, A list of the publications of the United States National Museum* (1875–1900), etc., 1902, from the Secretary, Smithsonian Institution; *Kickx, Relation d'une promenade botanique et agricole dans la Campine* (1835), from Prof. A. Cogniaux; 7 paintings of Orchids, from Mr. J. F. Last; 49 plates from the *Acta horti petropolitani*, from Mr. S. Sommier; *Preliminary list of vernacular names of Trees, Shrubs, etc., found in the forests of the Madras Presidency*, 1901, from Mr. A. W. B. Higgs; *Maiden, The Forest Flora of New South Wales*, parts 1–5, 1902–03, from the Hon. the Secretary for Lands, N.S. Wales; and *A critical revision of the genus Eucalyptus*, parts 1–3, 1903, also by Mr. Maiden, from the author; *Mann, The Tea soils of Uchar and Sylhet*, 1903, from the Secretary of the Indian Tea Association, Calcutta; *Micheli, Leguminosae Langlasseanae*, 1903, from Madame Micheli; *Map of the Republic of Peru*, 1903, from the Consul of Peru, Southampton; *Rodway, The Tasmanian Flora*, 1903, from the Hon. the Treasurer for Tasmania; *Spoerry, Die Verwendung des Bambus in Japan*, etc., 1903, from Sir W. T. Thiselton-Dyer, K.C.M.G.; *Theobald, First report on Economic Zoology*, 1903, from the Trustees of the British Museum; *Watt & Mann, The Pests and Blights of the Tea Plant*, ed. 2, 1903, from the Reporter on Economic Products to the Government of India; *Warburg, Baum's Kunene-Sambesi Expedition*, 1903, from Mr. J. G. Baker; *Bollettino agricole e commerciale della Colonia Eritrea*, 1903, from Dr. J. Baldrati; 10 original sketches of Australasian (chiefly New Zealand) Trees, by W. Swainson, from Miss Quinan. The following works have been presented by their respective authors: *E. A. L. Batters, A catalogue of the British Marine Algae*, 1902; *E. Boulanger, Germination de l'Ascospore de la Truffe*, 1903, and

Les mycelium truffiers blancs, 1903; F. Chauvel, *Recherches sur la famille des Oxalidacées*, 1903; A. Cogniaux, *Petite Flore de Belgique*, ed. 3, 1895, and *Éléments de sciences naturelles* *Botanique*, ed. 12, 1901; J. A. Dominguez, *Datos para la Materia Médica Argentina*, i., 1903; J. F. Duthie, *Flora of the Upper Gangetic Plain*, etc., part 1, 1903, 2 copies; Sir W. T. Thiselton-Dyer, *Morphological notes*, i.-x.; N. Gustasp, *Das Stockholz*, 1903; A. von Huegel, *Charles von Huegel, 1795-1870*, 1903; T. Ito, *New lessons in elementary Botany* [1903?]; B. Kotô & S. Kanazawa, *A catalogue of the romanized geographical names of Korea*, 1903; O. Lignier, *Le fruit du Williamsonia Gigas, Carr., et les Bennettiales*, 1903; U. Martelli, *Le collezioni di G. E. Rumpf acquistate dal Granduca Cosimo III. de Medici*, 1903; E. D. Merrill, *Botanical work in the Philippines*, 1903; F. Niedenzu, *De genere Heteropteryge*, 1903; A. Rehder, *Synopsis of the genus Lonicera*, 1903; F. Sander & Co., *Addenda to Sander's Orchid Guide*, 1903; C. S. Sargent, *The Silva of North America*, supplement vol. xiv., 1902; H. Schinz, *Versuch einer monographischen Übersicht der Gattung Sebacia*, 1903, and other papers; M. J. Teesdale, *The Trees of Dulwich*, 1902; A. Whyte, *Report on travels along the sea-coast belt of the British East Africa Protectorate*, 1903; the continuation of *Natal Plants*, by J. Medley Wood, also from the author. The continuations of several periodicals have been received from Sir J. D. Hooker, G.C.S.I. Mention should also be made of the numerous pamphlets which have mostly been presented by their respective authors, including Prof. G. Arcangeli, Mr. W. W. Ashe, Dr. I. Baldrati, Prof. A. Cogniaux, Dr. W. C. Coker, Prof. E. Hackel, Dr. F. B. Power, Prof. F. Ramaley, and Prof. C. S. Sargent, and of the numerous publications of the United States Department of Agriculture which have been presented by the Secretary of Agriculture.

Presentations to the Library during 1904.—The numerous presentations by the Bentham Trustees include: *Burgess, Eidendendron, views of the general character and appearance of trees*, 1827-31; *Drapiez, Herbier de l'amateur de fleurs*, etc., 1828-35, 8 vols.; *Hofland, A descriptive account of the mansion and gardens of White-Knights*, 1820; *Markham, A way to get wealth*, etc., 1683-84; *Mattioli, Herbár aneb Bylinář*, 1596, a Bohemian edition of Mattioli's well-known work, by Huber and Adam; *Nova Acta Academiae Caesareae Leopoldino-Carolinae Naturae Curiosorum*, vols. xxvi. pars. 2 to vol. lxxix., 1858-1901; *Cordus, Annotationes in Pedacii Dioscoridis Anazarbei de medica materia libros v.*, etc., 1561; C[hambers], *An olde thrift newly revived*, 1612; *Cook, The manner of raising, ordering, and improving forest trees*, ed. 2, 1717; *Hollós, Gasteromycetes Hungariae*, 1904; *Oltmanns, Morphologie und Biologie der Algen*, Bd. i., 1904; *Colgan, Flora of the County Dublin*, 1904; *Townsend, Flora of Hampshire*, ed. 2, 1904; *Wooster, Alpine Plants*, 1874, 2 vols.; *Kane, Arctic explorations in the years 1853-55, 1856-57*, 2 vols.; *Pinto, How I crossed Africa from the Atlantic to the Indian Ocean*, 1881, 2 vols.; also the continuation of about 20 serial publications. Sir W. T. Thiselton-Dyer, K.C.M.G., has presented

a large number of selected tracts from his own library, and the following: *André, L'art des jardins*, 1879; *Bartlett, The history and antiquities of the parish of Wimbledon*, 1865; [*Casey*], *Riviera Nature Notes*, 1898; *Engelmann, De Antholysi prodromus*, 1832, a dissertation; *Lawson, The agriculturist's manual*, 1836; *Pictorial Handbook of London*, 1854; *Abstracts of the papers printed in the Philosophical Transactions*, vols. i.-vi., 1832-54, and the continuation as *Proceedings of the Royal Society of London*, vols. vii.-xxx., 1856-80. The following works from the library of the late Mr. Hermann Herbst were presented by Mr. Geo. Nicholson: *Benary, Album Benary* [28 coloured plates of cultivated vegetables], 1876-82; *Bowler, South African Sketches*, 1854; *Eeden, Album van Eeden* . . . coloured plates of . . . *Bulbous Plants*, 1872-81; *Petit, Parcs et jardins des environs de Paris*, [s.a.]; *Pitot, Arbres de l'île Maurice*, [s.a.], a collection of 21 plates by Pitot and others; and handbooks of the World's Columbian Exhibition at Chicago in 1893, of the Exhibition Building at Melbourne, and of North Carolina and Oregon. Sir J. D. Hooker, G.C.S.I., has presented a number of tracts; the continuation of several periodicals; *Rein, Beiträge zur Kenntnis der spanischen Sierra Nevada*, 1899; and the volume published by the Reale Accademia dei Lincei, Rome, in commemoration of the tercentenary of its foundation. Prof. Hans Schinz has presented 24 dissertations, and 3 have been received from Prof. Hans Solereder. Kew is indebted to Mr. H. S. Thompson for the 4 following publications: *Dunn, A preliminary list of the alien Flora of Britain*, 1903; *Ralfs, The British Phænogamous Plants and Ferns*, 1839; *Sörensen, Norsk Flora*, 1896; and *Transactions of the Worcestershire Naturalists' Club*, 1847-99. *Scritti botanici pubblicati nella ricorrenza centenaria della morte di C. Allioni*, 1904, was received from Prof. Mattiolo; *Bigeard, Petite flore mycologique*, 1903, from Messrs. Dulau & Co.; *Bolus and Wolley-Dod, A list of the Flowering Plants and Ferns of the Cape Peninsula*, 1903, from Dr. H. Bolus; *Coville and Macdougall, Desert Botanical Laboratory of the Carnegie Institution*, 1903, from Prof. F. V. Coville; *Index Kewensis*, suppl. 2 (part 1), 7 copies, from the Delegates of the Clarendon Press, Oxford; *Plantae novae vel minus cognitae ex herbario horti thenensis*, 1 re [-2 me] livraison, and the continuation of *Plantae selectae horti thenensis*, from Monsieur L. van den Bosch; the continuation of the botanical publications of the Musée du Congo, from the Secrétaire Général du Département de l'Intérieur, Brussels; *Lelievre, Nouveau jardinier de la Louisiane*, 1838, from Mr. W. Beer; *Catalogue of the books* . . . in the *British Museum (Natural History)*, vols. i.-ii., 1903-04, and *The History of the Collections contained in the Natural History Departments of the British Museum*, vol. i., 1904, from the Trustees of the British Museum; *Macknight, Food for the Tropics*, 1904, from Messrs. W. Thacker & Co.; *Schlich's Manual of Forestry*, vol. ii., ed. 3, 1904, from the Registrar and Superintendent of Records, India Office; *Niles, Bog-trotting for Orchids*, 1904, from Messrs. Putnam; *First Report of the Wellcome Research Laboratories of the Gordon Memorial College, Khartoum*, 1904, from the Director; *Annals of the Kilmarnock Glenfield Ramblers' Society*, 1893-1904, from Mr. D. Murray through Dr. A. Henry; *Recueil des Travaux*

Botaniques Néerlandais, No. 1, 1904, from the Société Botanique Néerlandaise; *Roxburgh, Flora indica*, a copy of the manuscript containing the Cryptogams as well as the Phanerogams, from Mr. Douglas M. Govan and Major-General C. M. Govan. The following have been presented by their respective authors: *R. T. Baker, Botanical papers on the Australian Flora*, 1904; *C. Beadle, Chapters on papermaking*, vol. i., 1904; *G. E. C. Beauvisage, Genera montrouzierana plantarum Novae Caledoniae*, 1901, and *Guide des étudiants au jardin botanique de la Faculté de Médecine et de Pharmacie de Lyon*, ed. 4, 1903; *F. O. Bower, Studies in the morphology of spore-producing members*, part 5, 1903; *P. T. Cleve, A treatise on the Phytoplankton of the Atlantic and its tributaries*, 1897; *E. J. Cole, Grand Rapids Flora*, 1901; *De Wildeman, Notices sur des plantes utiles ou intéressantes de la Flore du Congo*, fasc. i., 1903; *A. Farman, Place-name synonyms classified*, and *Place-name correspondences*, 1904; *W. Fawcett, Guide to the Botanic Gardens, Castleton, Jamaica*, 1904; *P. Fitzgerald, A handbook to Kew Palace*, [s. a.]; *B. P. G. Hochreutiner, Le Sud-Oranais*, 1904; *W. H. Johnson, The cultivation and preparation of Pará Rubber*, 1904; *D. M. Mottier, Fecundation in Plants*, 1904; *D. Prain, Bengal Plants*, 1903, 2 vols.; *A. B. Rendle, The classification of Flowering Plants*, vol. i., 1904; *L. Sodiro, Contribuciones al conocimiento de la flora ecuatoriana, Monografías ii.-iii.*, 1903. The publications of the Bureau of Government Laboratories of the Philippine Islands have been received from the Superintendent and Mr. E. D. Merrill, those of the Botanic Garden, Buitenzorg, from Dr. M. Treub, and a selection of those of the United States Department of Agriculture, from the Secretary of Agriculture. Amongst the numerous donors of pamphlets may also be mentioned Dr. A. Baldacci, Prof. H. G. Hallier, Prof. A. S. Hitchcock, Mrs. Olga Fedtschenko, Mr. Boris Fedtschenko, and Prof. O. Lignier.

Liberia.—The Library of the Royal Botanic Gardens is indebted to its author for a copy of this work.* This gift is but the latest manifestation of Sir Harry Johnston's great and unfailing generosity to Kew.

The work gives an extremely interesting account of the history of the territories that are included in the Republic of Liberia and of the progress and present condition of the State.

The physical features, climatic conditions and natural history of Liberia are fully discussed and amply illustrated. The part devoted to the flora, which is that in which the readers of the *Bulletin* are more immediately interested, consists of about 150 pages with 58 illustrations, chiefly of useful plants, with a sprinkling of peculiar and new types, partly from Sir Harry's own drawings, partly from Miss Matilda Smith's pen and ink sketches. It opens with an interesting chapter by Sir Harry on the aspects, composition, uses, etc., of the vegetation. This is followed by a briefly descriptive enumeration of all the phanerogams and higher cryptogams at present known to inhabit

* Liberia: By Sir Harry Johnston, G.C.M.G., K.C.B., D.Sc. With an Appendix on the Flora of Liberia by Dr. Otto Stapf, F.L.S., 2 vols. London: Hutchinson & Co., 1906.

the country, by Dr. Otto Stapf. Of course it can only be regarded as a fragment, some natural orders that almost certainly occur in Liberia not being represented in the collections, whilst other groups are very poorly represented. Of ferns, for example, only four species are enumerated and only seven orchids. But this fragment will doubtless be very useful, as it includes a large percentage of plants of economic value. Altogether about 540 species are enumerated, belonging to ninety natural orders. The orders most numerously represented are :—*Leguminosae*, 60 species; *Rubiaceae*, 50; *Apocynaceae*, 38; *Cyperaceae*, 29; and *Gramineae*, 25 species. Mr. Alexander Whyte's collection was by far the largest, and the consolidated collection yielded four new genera and about seventy new species mostly described in the 37th volume of the *Journal of the Linnean Society*. Mr. Whyte paid special attention to rubber-yielding plants, especially those belonging to the order *Apocynaceae*; the most important are accurately figured.

Botanical Magazine for July.—The plants figured are : *Euphorbia procumbens*, Mill., *Deutzia Wilsoni*, Duthie, *Paphiopedilum glaucophyllum*, J. J. Smith, *Gurania malacophylla*, Cogn., and *Genista cinerea*, DC. The *Euphorbia* is a dwarf, succulent, South African species, allied to *E. Caput-medusae*, Linn., but differs in having brightly coloured lobes to the involucre. The specimen figured is in the possession of Mr. Justus Corderoy, of Didcot. *Deutzia Wilsoni* is a free-flowering new species from Western China, differing only very slightly from *D. discolor*, Hemsl. The material from which the drawing was prepared was supplied by Messrs. J. Veitch & Sons. *Paphiopedilum glaucophyllum*, a recent introduction from Java, resembles the well-known *P. chamberlainianum*, Pfitzer, from which it is distinguished by having uniformly coloured, glaucous and broader leaves, and pubescent petals. The Kew plant was purchased from Messrs. F. Sander & Sons. It remains in flower for a long time. *Gurania* is a curious cucurbitaceous genus, the species of which are usually, if not always, dioecious, and mostly, as in the case of *G. malacophylla*, known only in the male form. This species is a native of the Upper Amazons, and was figured from a specimen communicated by Mr. Ed. André, who had it in cultivation as *G. eriantha*, Cogn., a species with a spicate, not a globose, inflorescence. The *Genista* is a small, free-flowering shrub, "a characteristic constituent of the bush vegetation and the underwood of the forests of the western Mediterranean region." It has been in cultivation for many years, but is apparently not well-known.

Flora of Tropical Africa.—With the issue of Part III. of Section 2 the fourth volume of the *Flora of Tropical Africa* has been completed. It contains the conclusion of the *Scrophulariaceae* (pp. 385-466) by Mr. W. B. Hemsley and Mr. S. A. Skan, the *Orobanchaceae* (pp. 462-468), *Lentibulariaceae* (pp. 468-499) and *Pedalineae* (pp. 538-570) by Dr. O. Stapf, the *Gesneraceae* (pp. 499-512) by Mr. J. G. Baker and C. B. Clarke, and the *Bignoniaceae* (pp. 512-538) by Mr. T. A. Sprague, and "Addenda" (pp. 571-575).

The Tropical African genera of *Scrophulariaceae* are now brought up to 54 with 368 species. In this part 29 species of

Scrophulariaceae are described for the first time, by Mr. Skan, but no new genus is added. There are four genera recorded which are endemic in tropical Africa, but two of them are very closely allied to other genera of wide distribution. On the other hand the number of non-endemic species is surprisingly small. The tribe *Gerardieae*, most species of which are treated in this part, numbers not less than 179 species or about one-half of all the tropical African *Scrophulariaceae*. This is noteworthy as probably most of them are more or less parasitic. This circumstance no doubt also accounts for their absence from our green-houses, which not a few of them would adorn on account of their brilliant flowers. To show the enormous extension of our knowledge of the flora of tropical Africa during the last 25 years, it may be worth mentioning that almost two-thirds (62·8 per cent.) of the Tropical African species of this family have only become known since the beginning of 1881. This is a family which with few exceptions does not attract the collector very particularly.

The *Orobanchaceae* comprise only two genera, with seven species, none of them endemic in tropical Africa.

The *Lentibulariaceae* number 38 species in two genera: *Utricularia* (with 35 species) and *Genlisea*. The principal interest is, of course, in their very peculiar morphology and ecology; but one species which differs from all the Old World *Utricularias* in that it grows in rapid streams and is destitute of bladders, is also remarkable in so far as its only near ally lives under similar conditions in Brazil.

The *Gesneraceae*, so abundantly developed in South-Eastern Asia, are very scantily represented in tropical Africa, where only seven genera, with 33 species, are known. They are, however, geographically interesting. Four genera (three of them monotypic) are endemic in tropical Africa, inhabiting mostly very limited areas, whilst a fifth genus (*Streptocarpus*, with 23 species) extends beyond tropical Africa only as far as extra-tropical South Africa and Madagascar.

The *Bignoniaceae* comprise ten genera, with 38 species, of which seven (species of *Kigelia*) are new. All the genera with the exception of two, which extend into the Indo-Malayan region, are African. The general tendency of the order towards differentiation into small genera is also evident in the African *Bignoniaceae*, only one genus (*Kigelia*) numbering more than five species.

The *Pedaliaceae*, an order limited entirely to the Old World, are represented by 12 genera, with 53 species, most of which are endemic in tropical Africa. Of the genera, only two extend beyond Africa, being represented by a very few species in Southern India. Out of the 53 species described here, 33, or almost two-thirds, have only become known within the last 25 years. The order is remarkable on account of the great diversity of the structure of the fruit; but many species also possess handsome and often curiously shaped flowers, and might with advantage be introduced into cultivation. The best known member of the order—the Sesame plant (*Sesamum indicum*)—may

now, from its distribution in Africa, and its close relationship to species endemic in Africa, almost with certainty be considered as of African origin.

Botanical Survey of Tropical Africa.—The conclusion of the fourth volume of the *Flora of Tropical Africa* affords an opportunity for briefly summarising the whole of its contents with regard to the progress which it marks in the botanical survey of tropical Africa.

When, in 1891, it was decided to resume the preparation of the *Flora of Tropical Africa*, one volume was assigned to the orders *Oleaceae* to *Pedaliaceae* of Bentham and Hooker's "Genera Plantarum." At that time the number of species of those orders recorded as occurring in tropical Africa might have been estimated at somewhat over 700. Volume III. contains 1,134 species. Allotting to volume IV. approximately the same number of species, there was therefore a margin for 400 additional species, corresponding to an increase of 60 per cent. But so extraordinary was the accession of new material during the progress of the preparation of volume IV., that in the end the number of species of the orders reserved for it rose to 2,176, double the original estimate. That, of course, necessitated the subdivision of the volume into two parts, each equalling in size an ordinary volume. The increase was very unequal in different orders—as will be seen from the list given below—varying in the larger orders (of over 100 species) from slightly over 50 per cent. in *Solanaceae* to well over 300 per cent. in *Apocynaceae*, and almost 600 per cent. in *Loganiaceae*. The significance of these figures will perhaps more readily be grasped when we consider that the increase from 813* species known before 1891 to 2,176 known at present means that for every three species then known, five species have since been added; and if we assume that the same proportions hold good in the case of the orders dealt with in the first three volumes of the *Flora of Tropical Africa*, these orders would, if worked out at present, fill at least eight volumes. That this is by no means an exaggerated view may be seen from the fact that the Tropical African *Myrsinaceae* and *Sapotaceae*, which in the third volume (1877) numbered 11 and 23 species respectively, are, in recently published monographs, represented by 36 and 92 species respectively.

This phenomenal increase of our knowledge of the flora of Tropical Africa since 1891 has been due to several causes. Old collections of very considerable extent which had only casually and partially been studied have now been worked up systematically (e.g. Barter's West African, Schweinfurth's Sudan, and Welwitsch's Angola collections); fresh collections have poured in as new countries were opened up or the establishment of botanical

* These figures include a number of species which, although known prior to 1891, were not recorded from tropical Africa until after 1890. To make out their exact number would have taken more time than could reasonably be spared; but it probably does not exceed 70 or 80, so that the species of the orders in question which were known from tropical Africa at the end of 1890 may be estimated as somewhat over 700.

stations in the older colonies facilitated a more exhaustive exploration of their neighbourhood; finally it was just then that Germany started with remarkable and well directed energy on the botanical survey of her colonies, with the result that in not a few orders 50 per cent or more of all the additions from recent collections are due to her enterprise.

The following table shows the increase in new species since 1891, distributed over the orders dealt with in volume IV. :—

—					Species known previous to 1891.	Species known since 1891.	Total.
<i>Vol. IV., Sect. 1. (issued Nov. 1904).</i>							
Oleaceae	...	...	...	...	14	52	66
Salvadoraceae	...	...	...	...	3	2	5
Apocynaceae	...	...	...	...	75	259	334
Asclepiadaceae	...	...	...	...	131	293	424
Loganiaceae	...	...	...	...	21	123	144
Gentianaceae	...	...	...	...	29	71	100
<i>Vol. IV., Sect. 2. (issued June 1906).</i>							
Hydrophyllaceae	...	...	...	...	6	1	7
Boraginaceae	...	...	...	...	74	64	138
Convolvulaceae	...	...	...	...	132	154	286
Solanaceae	...	...	...	...	89	46	135
Scrophulariaceae	...	...	...	...	154	216	370
Orobanchaceae	...	...	...	...	5	—	5
Lentibulariaceae	...	...	...	...	25	13	38
Gesneraceae	...	...	...	...	12	21	33
Bignoniaceae	...	...	...	...	18	20	38
Pedaliaceae	...	...	...	...	25	28	53
Total	...	...	...	...	813	1,363	2,176

O. S.

PRICES OF FINE PARA RUBBER DURING EACH YEAR FROM 1877 TO 1906 INCLUSIVE IN LONDON AND LIVERPOOL AND
OF CULTIVATED PARA (CEYLON & STRAITS SETTLEMENTS) FROM 1903 TO 1906 INCLUSIVE (COMPILED FROM THE LISTS OF MESSRS HECHT, LEVIS & KAHN)

